August 1992 Issue #13

Radio Fun

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"The beginner's guide to the exciting world of amateur radio."

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BEHEMOTH visits Radio Fun/73

High-tech nomad Steve Roberts N4RVE (Nomad 4 Recumbent Vehicle Escapades) recently paid us a visit at the *Radio Fun/73* headquarters. Inside his mobile office and workshop (called the Mother Ship) was his latest recumbent bicycle creation which he calls BEHEMOTH (Big Electronic Human Energized Machine . . . Only Too Heavy). Steve started his high-tech nomadic adventures with his first machine called the Winnebiko in 1983 and put in 10,000 miles of travel during the first 1-1/2 years. During 1986 and 1987 he logged over 6,000 miles, along with his companion Maggie Victor KA8ZYW, with his Winnebiko II (see the February 1988 issue of *73*, page 11).

A result of 3-1/2 years of intensive work, the BEHEMOTH system consists of a 105-speed recumbent bicycle that carries a massive array of computing and communications equipment that allows him to write articles and books and to interface with the digital world while he rides across the country. Inside the front cover console he has a Macintosh with an LCD display which he uses for writing (he can write while riding through the use of a special binary keyboard in the handlebars), two IBM DOS machines, two UNIX-based machines: a SPARC IPC Sun workstation and a Tadpole SPARC SPARCbook laptop (guess this makes BEHEMOTH a UNIX-cycle!), a 2 meter HT (ICOM µ2AT), a PacComm packet station, an MFJ-1278 unit for AMTOR and a Trimble GPS (Global Positioning Satellite) receiver to pinpoint his current position. In addition, the console contains the audio distribution network and the BEHEMOTH central control computer complete with an Audapter text-to-speech processor. Altogether there are over 45 microprocessors total on the whole bike!

Photo A. High-tech nomad Steve Roberts N4RVE travels through New Hampshire on his BEHEMOTH recumbent bicycle.

Behind the main bicycle is a trailer he calls the Wheeled Auxiliary Storage Unit (the WASU). This contains his ham station, the Solarex solar panel and battery system that powers everything and a Qualcomm OmniTRACS satellite station. The two-way satellite link allows Steve to directly tie into the Internet so he can receive or respond to his mail. The Internet consists of a massive network of inter-tied computers spanning the globe—Steve calls this environment "Dataspace."

In the back of the WASU unit is a fully-equipped ham station which Steve operates during his journeys. The ham station consists of an ICOM 725 HF rig, Yaesu 290 and 790 rigs for VHF and UHF, an IC-24AT for the backpack and an AEA ATV station. A series of Larsen antennas are scattered on top of the solar panel array for VHF, UHF and his cellular telephone link. For HF, Steve has a very effective dipole constructed out of two Outbacker mobile antennas mounted on a telescoping Fiberglas pole.

Fully loaded, the BEHEMOTH bicycle and trailer weigh in at 580 pounds. Steve's average cruising speed is about 9 to 10 mph, but he has had it up to 48 mph during some downhill runs. He has put in over 1,000 miles since the inaugural run during the summer of 1991.

If you'd like to find out more about high-tech nomadic adventures and technology, Steve publishes a quarterly magazine called *Nomadness*. It is a 50-50 mix of adventure and the technology necessary for full-time wandering. It's available for $15/year from Nomadic Research Labs, P.O. Box 2185, El Segundo CA 90245. You can communicate with Steve directly via the Internet at wordy @lorien.qualcomm.com.

Photo B. Steve Roberts N4RVE takes a break to operate on 20 meters from his ham station onboard BEHEMOTH.

New Mac Area on RF/73 BBS

After much deliberation (in the order of microseconds), our Associate Publisher and resident Mac-aholic, David Cassidy N1GPH, decided to add a Macintosh message and file area to the *Radio Fun/73* phone line BBS. Anyone with a MAC is welcome to upload and download Macintosh files (use MacBinary to transfer files—also use a compression format such as StuffIt or Compact Pro for uploads) and applications and use the message area as a forum for amateur radio Mac applications.

You can access the RF/73 BBS at (603) 924-9343 (up to 2400 baud). The Mac forum can be found in area #2.

NorthWest QRP Club

The Northwest QRP Net has made a giant move and formed the "NorthWest QRP Club." According to a news release from the group, there has been a great deal of interest in forming an alternative QRP club based out of the West Coast. The NW QRP Club is designed for all QRP stations, not just those who happen to live in the northwest corner of the US. The group will also publish a newsletter every other month. The first issue is planned for June 1. If you would be interested in becoming a member of the NW QRP Club, send an SASE to ARS N7MFB/QRP, The NW QRP Club, 916 Queen Anne Avenue North, #203, Seattle WA 98109. *TNX to N7MFB and Westlink Report #626, May 28, 1992.*

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. . . de N1GPH

David Cassidy N1GPH, Associate Publisher

Hi! It's been about a year since I last addressed the readers of *Radio Fun*. As promised, unless I have something of interest to all, I would rather this space be filled with another construction article, news item or equipment review. However, I came across something the other day that made me so angry, I had to do something about it.

Whenever I'm on packet and see a public message regarding the Technician license, I make it a point to read what the writer's view is. A few days ago, I was checking messages on my local packet BBS, and just such a message was posted. I read the message and immediately started to boil!

I didn't copy the message (I wish I had, so I could give it to you word-for-word), but I'll give you the main points. The writer of the message was asking if it was legal for a ham radio club to restrict their Technician class members from using certain privileges, like the repeater autopatch and voting in club elections. It seems that this policy has been set up at a local club, and the writer was curious if this was somehow against FCC regulations.

While this may not be breaking any regulations or laws, I can't believe that a group of radio amateurs could institute such a bigoted, stupid set of rules. I thought this "code – no-code" thing was behind us. Obviously, some old farts with superior attitudes but inferior intelligence have decided that *they* don't have to associate with what they obviously consider "inferior amateurs."

Any old-timer (and I am quickly approaching that status) who has spent time talking with any of the new crop of Technician class licensees will tell you that the no-code ruling has – with amazingly few exceptions – provided the Amateur Radio Service with a new population of skilled, eager and knowledgeable hams. Anyone who is *still* hanging on to Morse code as some kind of guarantee of quality is simply living with their eyes closed.

I wrote a packet message back to the writer, suggesting that local hams should avoid that club like the plague. If they are members, quit. Stay off of their repeater. Without new blood and enthusiastic members, the club will soon die of neglect and old age. It might also be helpful to find out if this club is an ARRL affiliated club. If they are, perhaps the ARRL would be interested in hearing about it. I would also suggest that a bunch of hams get together and start a new club in that area – one more concerned with the future of amateur radio than the past.

Let Me Hear from You

The main reason I decided to write this editorial is to ask you all a favor. I want to hear from you – all of you – about your experiences with amateur radio clubs, repeater groups, etc. I especially want to hear from any Technician class hams. Are any of you experiencing the same narrow-minded prejudice described above? Have the hams on your local repeater been rude to you? On the other hand, have you found a club that has welcomed you with open arms? Have you come across an individual or group of hams who, in the true spirit of the Amateur Radio Service, have welcomed you into our fraternity with patience, understanding and kindness?

I want you to name names. I want to know exactly which clubs are the good ones, and which are the bad apples. I want to know the names and callsigns of the club officers – good and bad. Any club (or individual ham, for that matter) that acts against a certain group of amateurs is acting against *all* of amateur radio.

It is unfortunate that a relatively small group of misguided souls is trying to undermine the overwhelming success of the codeless license. Let's shed a little light of reason on these fools, before their poison spreads any further. Write to me c/o *Radio Fun*, 70 Route 202-North, Peterborough, NH 03458. RF

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Ham Shack Design for Beginners

Novices, take note!

Paul M. Danzer N1II

One set of questions usually asked by new hams concerns the practical aspects of setting up a new station. These questions are often difficult to answer since they can affect the new ham's entire family, assuming the station is to be located at home.

Question: I just got my call in the mail and now want to set up my station. What is the minimum I need for the operating position?

Answer: I have seen ham shacks ranging from a separate building containing a TV set, stereo, bathroom, and refrigerator to one built into a single desk drawer. However, at a minimum you need an AC line outlet, a ground wire, and a way to run your antenna feedline.

Q: Let's take these one at a time. What about the AC line?

A: It would be nice if you had a single 120-volt line direct from your house fuse box with 20-amp service and a second 240-volt line for a linear amplifier. However, most of us end up plugging in a distribution box containing four or eight outlets, a fuse or breaker, a switch, and a pilot light. If you want to use a commercial box, there are several available, but they are only fused on one side; you really want fuses on both sides. See Figure 1.

Q: Why fuse both sides? I thought that most 120-volt AC lines have a neutral or common which is grounded.

A: It is a matter of safety. If you get a lightning strike that enters your home wiring, it is nice to have both sides of the line fused so that there is a chance the fuses or breakers will blow and protect your equipment.

Q: I take it that when I want to operate the station I simply have to flip one switch and I now have power to all the equipment?

A: Yes, but you will also want to have one or two AC sockets which bypass the switch so that power is always available to your clock, desk lamp, or any other equipment which you might want to use independent of your rig. You also might consider using a key switch if you have any small children around so that they cannot turn on your station.

Q: How much power should I plan on?

A: As a rough approximation, complete a table for your station such as the one shown in Figure 2.

Q: Well, just how many outlets do I want in total?

A: No ham in history has ever had enough outlets or current available. It is getting a little better now since many hams are also wiring their shacks with both 12 and 5 volts DC.

Q: Why would I want to do that?

A: Typically, you will end up with a main rig and then a half dozen solid-state accessories. If you build them independently, there also will be a half dozen small DC supplies, each of which must be plugged into the AC line. If you plan ahead a little and set up a 12-volt power supply at a few amps, you can power all of these units from the one supply. Most of the circuits around these days use 12 volts DC, with the exception of those using 5-volt digital logic. You can add a separate 5-volt DC supply or include a dropping resistor and voltage regulator in each of the 5-volt units.

Q: Will I be safer if I connect the ground bus to the AC power system?

A: Unless you are an experienced electrician, the only grounds you should use with the AC line are those built into the three-wire cords common on some equipment. Keep *your* ground bus separate.

Q: Since the ground bus is not connected to the AC line, what do I need it for?

A: You need a good ground primarily for safety. I use a 1" x 1/2" aluminum bar, running the length of my operating table. Every 6" I have drilled and tapped it to connect braid from the bus to each of the pieces of equipment. When I put a piece of equipment down on the operating table, I connect it to the ground bus before I plug it in, and when I want to remove it, I unplug before I disconnect the ground. If anything goes wrong, at least I don't end up with the 120-volt line voltage on the front panel of the equipment. See Figure 3.

Continued on page 6

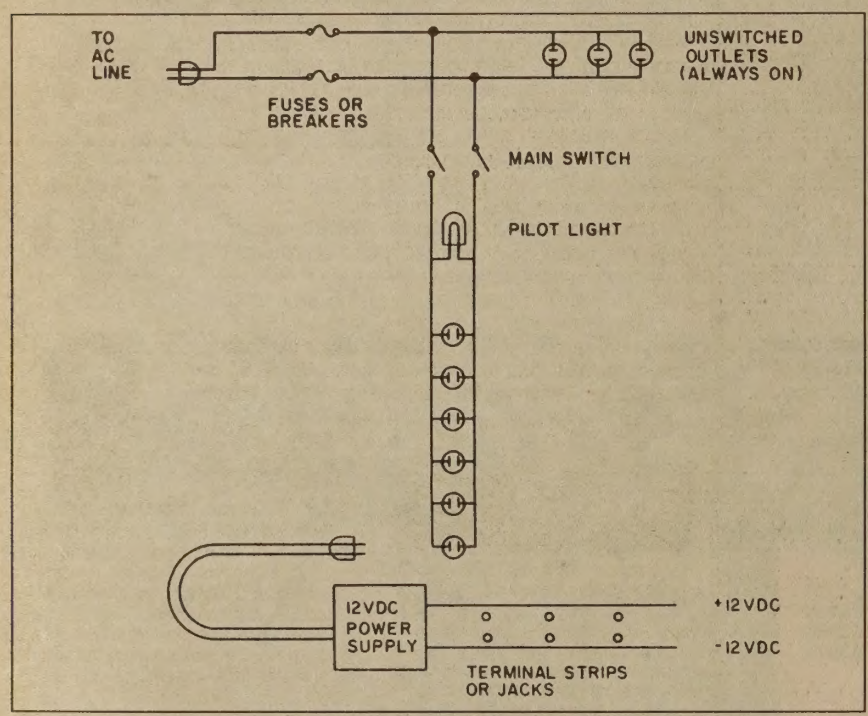

Figure 1.

	Example (Watts)	Your Station
Rig	400	
Keyer	20	
Clock	10	
Outboard Active		
CW Filter	10	
Antenna Rotor	75	
Desk Lamp	100	
Total	615 Watts	

Example: 615/120 = 5.125 Amps 5.125/0.8 = 6.4 Amps total
Your Station:_____/120 = _____Amps
_____/0.8 = _____Amps total
Take the total power and divide by 120 to get the current, and then divide by 0.8 to account for any power factor. The number you get is the Ampere load you will have to supply from the ac line.

Figure 2.

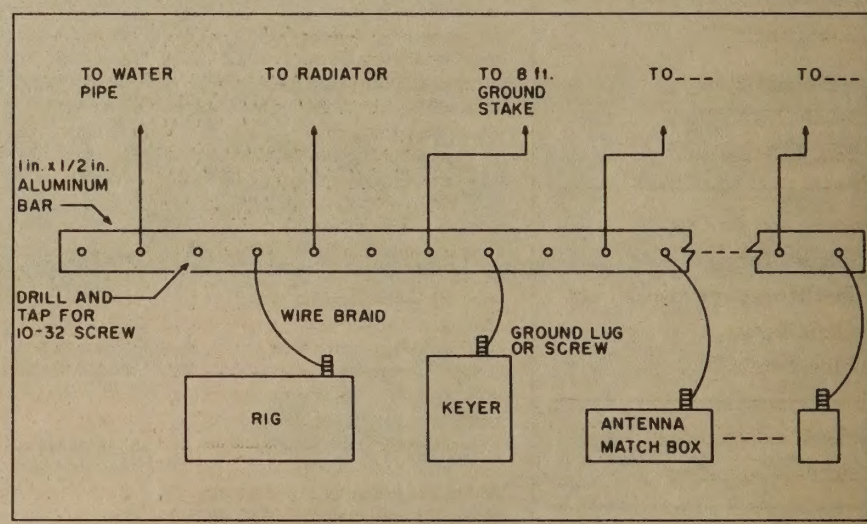

Figure 3.

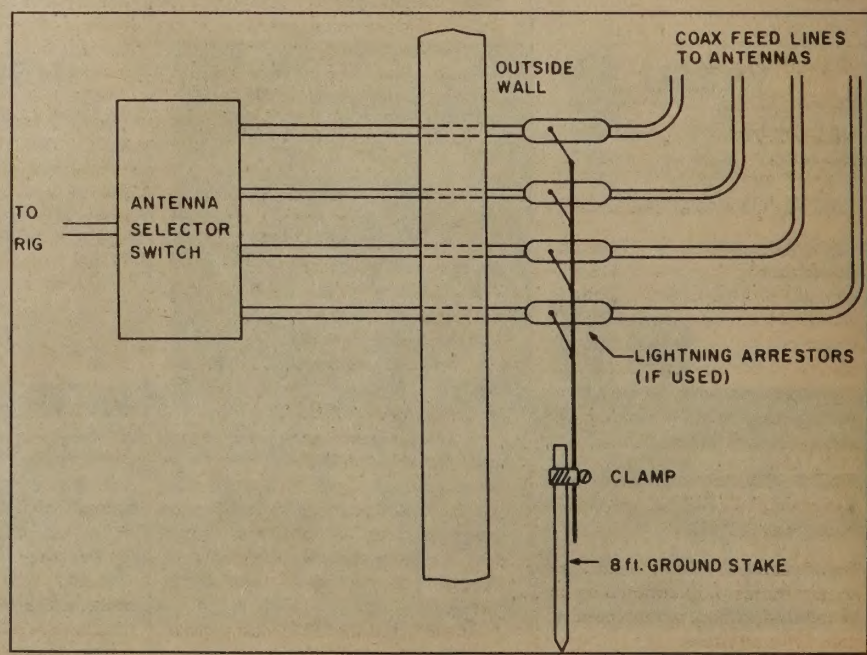

Figure 4.

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letters

Write to: Radio Fun, 70 Route 202-N, Peterborough, NH 03458

Jim Hale N5WSZ, Kingston AR I entered the ham hobby in September 1991 as a no-code. As a no-code I was told "Be a real ham; learn the code," then dismissed. Sometimes I hear that from boys in their 20s!

So I moved off the repeater and onto satellites. On RS-10 I have never heard any of this (more no-codes should try RS-10).

I passed the 5 wpm test with help from a ham in his 70s! But I find old and young fogies on 10 meters. I manage to avoid them. Even if you learn code it's not enough, I guess, for some folks.

Fifteen years ago I moved to the woods and now survive without any utilities. I get my electric power from the sun, and developed my own water. I guess "I know my place"!

I'm sticking with ham radio. We've got lots of positive folks for every jerk.

Grady W. Eaton KD4CEE, Milton FL Thanks for a publication that I can read, enjoy and understand much better than some of the others. I've only been in amateur radio about a year and have found immense pleasure in the hobby.

I got started sort of late in the life cycle and will probably never get beyond a dipole and whatever watts the radio puts out, but it's still fun.

As for the truck driver who became discouraged over getting a license, I say, "Don't give up the ship!" Knowing what little I know, if I were in his profession I would go all out to get myself a ham license to include the 10 meter band. I then would be able to "tune in the world" at various rest stops and layovers around the country.

I passed a truck on I-65 in Alabama about six months ago and he passed me a little while later (they usually do sooner or later). I noticed some sort of Stephen Foster signs on the trailer and a Bardstown, Kentucky, address. I couldn't help but give him a few lines from "My Old Kentucky Home." He picked right up on that and asked me how I liked the "2600" in my trunk. He must have seen it when I first passed him. Well, we talked about 15 minutes and he related that he was in the process of getting a no-code license. I encouraged him toward this and also toward getting into the code business as he seemed like a nice enough person and would be a welcome addition to the ranks of amateur radio.

So Mr. Truck Driver, if you don't have a callsign behind your name it's your fault. Don't be discouraged by some operators as they are the exception.

Grady—Don't stop at Novice and Tech. There's a great informal truckers net on 20 meters—14.303. Lots of nice folks.—David N1GPH

Robert M. Payne As of yet I am not a ham but am working my way towards my ticket. I plan to start with Tech Plus and work my way to Extra within five years.

I am an Airman First Class in the U.S. Air Force and have been interested in ham radio for about two years now. My job in the service is as a wideband communications equipment specialist; I operate and repair digital microwave radios.

The main reason I am writing is to address the subject of 2 meter operation. It seems to me that 2 meters has become the citizens' band of amateur radio, i.e. "the more power the better," crowded bands, everybody's got to have it, and everybody does. Plus all the rag-chewing and miscellaneous garbage.

Granted, it is one of the most popular bands in amateur radio, but don't they have anything better to do? Like how about experimenting with digital audio? How about SSTV, FSTV, satellite, microwave, remote TX or RX using fiber optics?

There are a lot of people out there doing great things for 2 meters and packet, but think of the ways they could further the technology of the hobby if they would apply it to things that people haven't already perfected in different frequencies and different modes. Or how about the bands we would lose to the commercial industry due to no use? Cellular phones are becoming more and more popular these days.

Do not think that I won't use 2 meters because I will, if not to experiment with new modes then to communicate while I do, but it won't be my main priority when it comes to ham radio.

As a last statement, I would like to say that when it comes to technology we are behind and if we don't use our frequencies we will lose them to commercial communication.

Bill Wageman K5MAT, Los Alamos NM I received my first license as a teen-ager in 1950, and I have been an active ham ever since except for a few years when our children were young. Ham radio shaped my life in many ways. I would almost certainly not have gone into science (it's hard to believe now, but at one time I wanted a career in the military!) or married my wife of nearly 38 years. My first exposure to ham radio was to witness a mobile-to-mobile contact from the central US to England. That excited me into trying to find out a bit more about how those crazy guys could do such a thing.

Fortunately I had learned the code as a Boy Scout, and my elmer helped me get my code speed up to 13 wpm (there was no Novice license in those days) and learn the necessary theory. He then gave me some old junk and helped me modify it so it could be used on CW in the ham bands. My folks were dirt poor and I needed all the help I could get. The process of learning about ham radio was directly responsible for my decision to work my way through college and go into physics as a career, a decision that I have never regretted.

In all probability I would never have met my wife, Carol, now W5TIK, if it had not been for ham radio. We both grew up in small Nebraska towns, and except for the fact that we were both hams, I'm sure our paths would never have crossed. Fortunately she, her father, and her brother did become hams shortly after I received my license, and our paths not only crossed, but became one. When we came to Los Alamos after graduate school I was able to help her dad get a position with the Los Alamos Scientific Laboratory, and that was an excellent decision for both the Laboratory and for her folks. He was able to have a much more fulfilling retirement for having changed careers in midlife, and he did an excellent job for the lab.

Our two sons are both hams (WB5WPD and KB5OTB), a daughter-in-law (N5QXZ) and son-in-law (KB5OTM) were both bitten by the bug. Now a grandson is telling us he wants to get a license, too.

I am trying to repay some small fraction of the debt that I owe to ham radio by teaching classes on a regular basis, and I am an active volunteer examiner. Ham clubs at the local high and middle schools have been formed in the last couple of years, and I like to feel that I am at least partly responsible for that fact.

I don't make a lot of money by some standards, but I have had a full and fulfilling career, and a wonderful wife and family. It's not unreasonable to say that I owe all of that to ham radio! **Continued on page 30**

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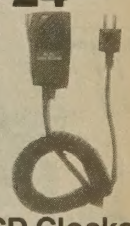

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New miniature speaker mics pack all the features of the compact models into a tiny 2" x 1¼" x ¼" package. The lapel pocket clip swivels for even more convenient positioning. Also features transmit LED. Choose from regular or "L" shaped connector. Order **MFJ-285 or MFJ-285L for Icom or Yaesu, MFJ-287 or MFJ-287L for Kenwood. MFJ-283 for dual plug Alinco.**

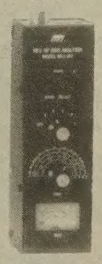
Deluxe 300 W Tuner

MFJ-949D **$149.95**

MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

SWR Analyzer

MFJ-207 **$99.95**



MFJ's innovative new SWR Analyzer gives you a complete picture of your antenna SWR over an entire band -- without a transmitter, SWR meter or any other equipment.!

Simply plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR. You can instantly find your antenna's true resonant frequency,something a noise bridge can't do. Covers 1.8-30 MHz (or choose **MFJ-208, $89.95** for 2 Meters). Use 9 V battery or 110 VAC with MFJ-1312, $12.95.

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MFJ-812B **$29.95**

Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4½x2¼x3 in.

MFJ Multiple DC Outlet

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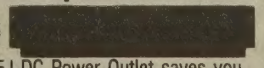

New MFJ DC Power Outlet saves you space **and** money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 13½x2¾x2½ in.

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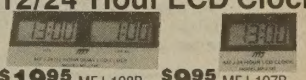


$19.95 MFJ-108B **$9.95** MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4½x1x2;MFJ-107B 2¼x1x2 in.

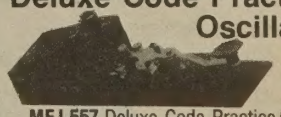
MFJ Cross-Needle SWR/Wattmeter

MFJ-815B **$69.95**

MFJ Cross-Needle SWR/Wattmeter has a new **peak** reading function! It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Deluxe Code Practice Oscillator



MFJ-557 **$24.95**

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter ($12.95) that plugs into a jack on the side.

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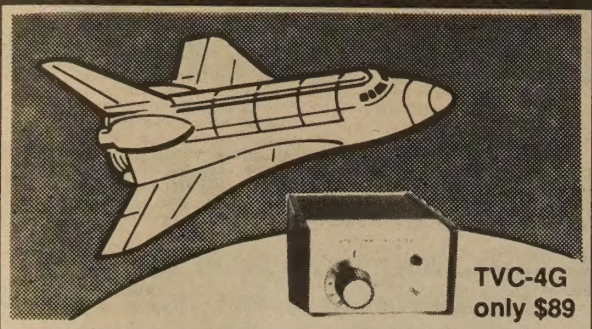
CIRCLE 86 ON READER SERVICE CARD

Continued from page 4

AMATEUR TELEVISION



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Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Satcom F2-R transponder 13. Others may be retransmitting weather radar during significant storms. If it is being done in your area on 70 CM - check page 413 in the 91-92 ARRL Repeater Directory or call us, ATV repeaters are springing up all over - all you need is one of the TVC-4G ATV 420-450 MHz downconveters, add any TV set to ch 2, 3 or 4 and a 70 CM antenna. We also have downconverters and antennas for the 900 and 1200 MHz amateur bands. In fact we are your one stop for all your ATV needs and info. Hams, call for our complete ATV catalog - antennas, transceivers, amplifiers. We ship most items within 24 hours after you call.

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CIRCLE 240 ON READER SERVICE CARD

Q: Where is the ground bus connected to? Can I use a hot-water pipe rather than a cold-water pipe? How about the radiators? How about the this or the that?

A: Yes, yes, yes. If in doubt, connect it to all of them. No one has an ideal ground and you cannot hurt anything by connecting it to more than one ground. Just stay away from the AC wiring. The most important thing is to use wide braid or heavy aluminum wire, securely clamped. You should also remember that these mechanical (non-soldered) connections corrode and should be cleaned and tightened periodically.

Q: Is this ground bus the same ground that is shown in the pictures of antennas?

A: If you are using a coax-fed antenna, such as a dipole or beam, the shield of the coax will be connected through your rig or matchbox to the ground bus. But the bus plays little if any part in the antenna performance. However, if you are using a matchbox to feed a longwire with no radials, the ground bus provides the other end of the antenna circuit and is doubly important. See Figure 4.

Q: What about antennas in setting up my shack?

A: Your shack must be located in such a way that you can run your antenna feedlines to the operating position. For this reason it is always nice to be close to an outside wall. Remember that no ham in history has ever had enough antennas, either. Plan ahead, and if you expect to run three lengths of coax into the shack, *plan* for at least six or eight and make whatever opening you drill through the wall big enough for the additional feedlines. It is much easier to stuff the extra space with loose Fiberglas insulation than to go back and drill some more. Figure 5 shows one possibility.

Q: I keep seeing pictures of ham shacks where the antenna coax, AC line, ground bus, and all of the wiring is hidden behind custom-made panels. Some of these shacks would put the best commercial installation to shame. Is this what I should plan on?

A: There is no question that designing and building a neat, custom-made installation provides some hams with just as much fun and challenge as working for DXCC. However, most hams "rack it and stack it" in the most convenient way. Whatever you do, remember that you will be making changes in your equipment, adding boxes and replacing boxes, so that you want the flexibility to change without major woodworking. If you do decide to "build it in," remember to leave room to get behind the units to work on the wiring.

Q: What about furniture?

A: My shack consisted of a folding card table for many years. I am now using an old desk with a spare door screwed on top to provide more area (Figure 6). Old desks are nice since they give you drawers for storing logs, callbooks, headphones, and several cubic feet of clutter which otherwise would lay around. You also can get more top area by mounting a shelf above the desktop with sections of 2" x 4" wood and L-brackets. Measure the height of the largest unit you expect to have on the bottom and then mount the shelf at least 4" above this height to give heat a chance to escape.

Q: How about the little things, such as a chair, lights, and such?

A: Spend six or eight hours in a contest and you will find these are not such little things. Some phone operators literally use large armchairs as they claim "armchair copy." CW operators usually opt for a stiff-backed chair with a soft cushion. The cushion is optional until contest time. The key thing is to be comfortable for the periods you are operating. For this reason, you also will want to modify your rig to fit your needs.

Q (with horror): Modify my brand-new rig? Won't that reduce its value when I want to sell it?

A: These modifications won't. First, look at the knobs. On CW I tend to ride both the volume control and the tuning control. I found it much more comfortable to replace the 2" diameter knob on my Heath SB-102 with a larger, 3" knob, and the fluted volume control with an identical size non-fluted knob. You also can change the height of the knobs by either drilling holes in the desktop for the rubber feet (lower the rig) or by placing the rubber feet on small wooden blocks to raise the knobs. You also can tilt the rig (Figure 7).

Q: Why tilt it?

A: Some people are more comfortable with the rig tilted backwards to put the frequency dial more fully in their line of sight. Others like to tilt it down. Since the total investment is a few pieces of wood, it pays to experiment. Also check that the room lights or your desk lamp don't reflect in or wash out the numbers on the new rigs with the digital dials.

Q: I already can see that I will run out of space quickly. Where else can I put things?

A: If you home-brew some of the station accessories, such as audio filters and keyers, you can mount them inside a 1" high chassis and slip them under the rig. A second approach is to suspend them from the bottom of the shelf. Separate power supplies can be placed under the operating position on the floor, and you can always hide things such as antenna rotor controls in a drawer.

Q: You said that the shack location and arrangement could affect the entire family. How is that?

A: Late-night operations with a loudspeaker or most of the old RTTY units pose an obvious problem. If you set up in a remote corner of the basement, consider including an intercom so that you can be called for dinner. An extension telephone is almost a necessity, but be forewarned, it will ring just as it is your turn to call the A9 station on the DX net.

Q: Anything else?

A: There have been several million ham years of experimentation with the arrangement of stations. The best bet is to visit a number of stations and see how they are arranged. Don't be overwhelmed by the amount of equipment you see. What you are looking for is how do you sit and how do you reach things. Then experiment before you plug in a single wire. The only thing for certain is that you will change the arrangement before very long and end up with just the right arrangement to suit *you*. RF

Reprinted from the November 1981 issue of 73 Magazine for Radio Amateurs.

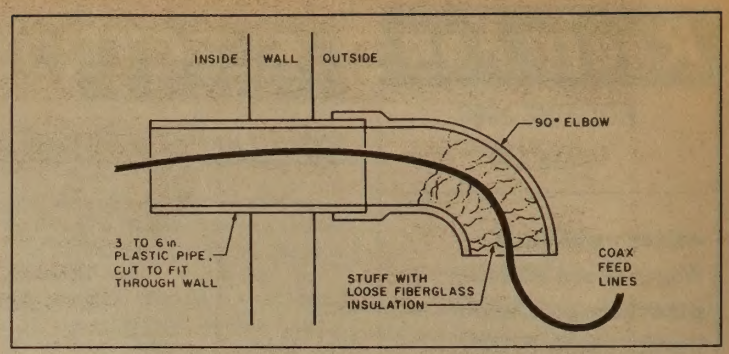


Figure 5.

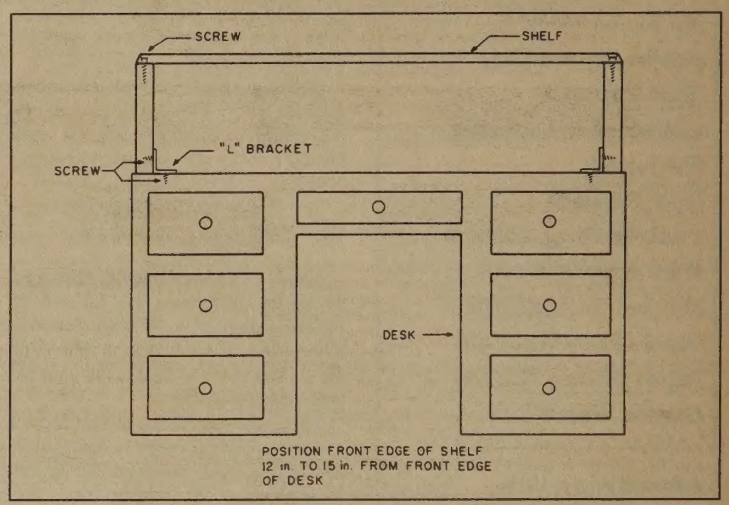


Figure 6.

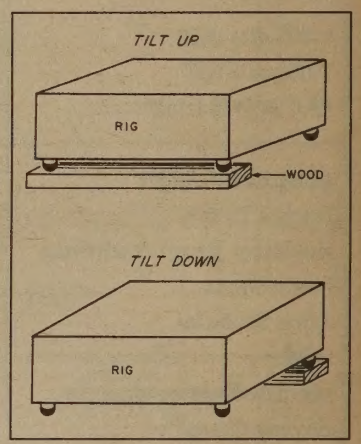
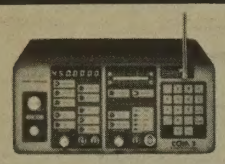


Figure 7.

RAMSEY ELECTRONICS



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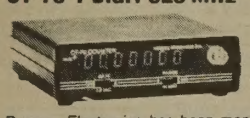

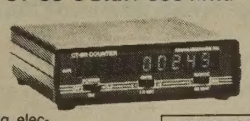

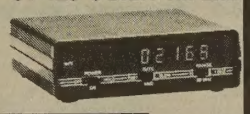

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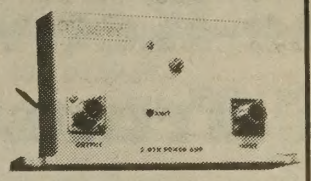

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CIRCLE 34 ON READER SERVICE CARD

RF vintage review

The Kenwood TS-530S HF Transceiver

Sophisticated performance at a not-so-sophisticated price.

by Paul Grupp KA1LR

When Kenwood announced that the TS-520S was about to be discontinued and replaced with a new model, I was somewhat apprehensive. For many of us, the venerable 520 was an old friend, a perfect example of what an economical transceiver should be—short on bells and whistles, but long on dependability and performance. Would the TS-530S be a worthy replacement? I had to find out, and you just might be interested in what I discovered.

Here is a brief description of the basic features of the 530. As expected, all amateur bands (160-10 meters) are included. The output stages conform to the *de facto* industry standard for transceivers with tube finals—two 6146Bs and a 12BY7 driver. Both analog and digital frequency readout are provided. The digital readout is the traditional Kenwood blue and displays to 100 Hz; the analog dial is accurate to within a couple kHz. Speech processor, VOX, semi-break-in CW, XIT (transmitter incremental tuning), and full metering are all standard. The receiver section boasts a noise blanker with a variable level control, fast or slow AGC, an RF gain control and attenuator, IF shift, RIT, and a 25 kHz crystal calibrator. Not a bad inventory! The manual is typical of those packed with recent Kenwood equipment—good operating instructions and enough schematics and block diagrams to get you into trouble. A complete service manual is also available.

Our 530 arrived in perfect working order, which is somewhat unusual for equipment from almost any manufacturer these days. We immediately installed it in the *73* shack alongside its more expensive brother, the TS-830S. The first thing that strikes you about these two rigs is their similarity. They are built on exactly the same chassis and housed in the same cabinet. Even the rear panel holes are punched in the same place, so the 530 has a few empty spaces where the 830 has jacks.

The similarities between the 530 and the 830 are more than skin deep, however. They share identical final sections, power supplies, VFO, digital readout, and RF boards. Almost all accessories are completely interchangeable, making the 530 a logical choice for a back-up rig in an 830-equipped station. Moreover, most of these accessories will also mate with the diminutive TS-130S. Such inter-

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changeability throughout their entire line of HF transceivers is a thoughtful step which might cost Kenwood a few sales of accessories to owners of two or more of their rigs. It will pay off because Kenwood will earn the loyalty of customers who don't wish to replace the entire station each time they upgrade to a new transceiver. Another blow against planned obsolescence!

The 530 is not quite a carbon copy of the 830. In the bells-and-whistles department, it has an audio rather than an RF speech processor, and it lacks the transverter jacks, VBT, tone control, notch filter, and digital hold switch of the 830. On the positive side, the 530 allows both CW and SSB filters to be switched in and out at will. Its big brother only accepts one or the other. Performance? Kenwood rates the 530 receiver's IF rejection and the transmitter's sideband suppression each 10 dB worse than the 830. All other specifications are the same.

How important these differences are depends entirely on individual operating habits and tastes. Some may miss the extra features of the 830 sorely, but others will balk at spending the approximately 125 dollars more that the 830 costs to get them. One thing's for sure—the 530 has a lot more to offer than the 520 did!

On the Air

We could talk about features and performance until I ran out of paper and you ran out of patience, but it would all be meaningless if the radio in question didn't "play." The 530 plays! The 530S held a position of honor (front and center on the operating desk) for its entire stay at the *73 Magazine* ham station. One of the things that makes it so successful is the sensible layout of the front panel. Every control has its own knob—there are no concentric controls to fumble with. If you adjust the carrier control, you don't run the risk of messing up the setting of the mike gain control. Nor will you go through an operating session where the band appears to be dead, only to discover that you inadvertently turned down the RF gain control while adjusting the volume! This clean front panel layout should make the 530 an excellent choice for a contest station. Our test was in the summer activity doldrums, so the only contest we could run it in was the Field Day weekend. The QRM, pressure, and excitement were all there, and it performed admirably.

Receiver audio bears the distinctive Kenwood trademark of wide frequency response with a broad mid-range peak for added presence, with or without a good external speaker. Hams with good ears who have done a lot of listening to different transceivers could probably pick out the Kenwood every time in a blindfold comparison test.

I was very pleased at how easy the 530 is to tune up. I generally prefer solid-state finals, but the 530 is so easy to tune that I didn't mind a bit. Complaints? A particularly rabid CW operator (AG9V/1) felt that the 500 Hz filter didn't have enough ultimate rejection. On the other hand, it is well known that he is hopelessly attached to the 250 Hz filter installed in his S-line at home!

Conclusions

What constantly surprised everyone here who used the 530 is how well it fares in comparison to Kenwood's top-dollar flagship, even though they are not necessarily designed to compete. The TS-520S would not compare as favorably, even though a digital-readout-equipped version retailed for quite a bit more than the 530 does! Kenwood has a worthy successor for the venerable TS-520S, a successor that has a lot to offer at a reasonable price. RF

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RF review

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The MFJ-1730 Pocket Roll-Up Antenna

An inexpensive portable antenna.

by Bill Clarke WA4BLC

Recently MFJ announced an intriguing new portable 2 meter antenna. The MFJ-1730 Pocket Roll-Up Antenna is a piece of twin-lead attached to a short coax feedline. The dimensions are about 54 inches of feedline (RG-58) and a similar length of radiator. It has a BNC connector for attachment to an HT. You can use an Amphenol #2900 BNC to SO-239 adapter (Radio Shack #278-121 is similar) if needed.

This little antenna is designed to hang vertically and to that end has a neat hole punched in the far end of the twin-lead. A clothespin might do well for the purpose.

I hung the antenna on my window curtain and tried it. It worked well on the first try. There is nothing to adjust with this antenna. I checked the SWR and found it to be acceptable for the entire 2 meter repeater band.

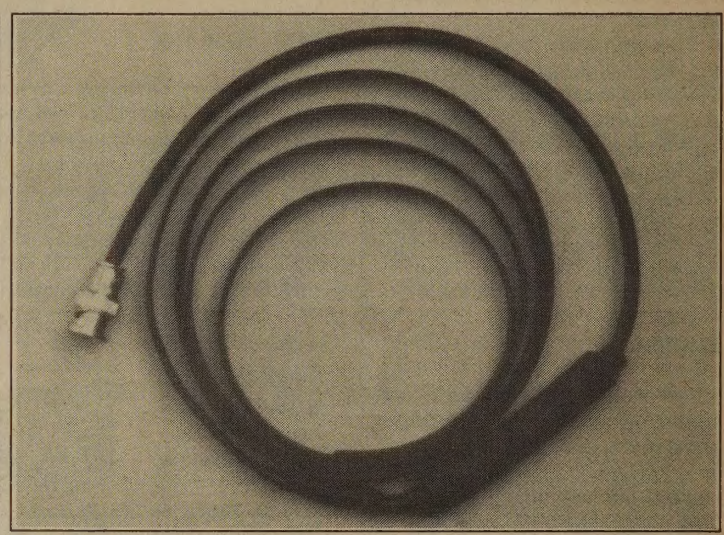

Photo A. The MFJ-1730 Pocket Roll-Up Antenna.

Placement of the Antenna

Placement is very important with this antenna. My window frames are vinyl-covered wood, so there was no detuning problem encountered when hanging the antenna close to the window. This should be a consideration, however, as many windows have aluminum frames that could cause detuning of the antenna.

Although I chose my window curtains as a place to hang the Roll-Up, other likely places include a tree branch when picnicking, a balcony roof in an apartment or condo, or on patio door windows. The instructions point out that the antenna could be sealed inside a piece of 5/8" diameter PVC pipe for permanent outdoor installations. I did not try this but it does sound like an inexpensive invisible antenna.

How It Works

The Roll-Up Antenna is a flexible J-pole. That is a two-element antenna operating as a half-wave antenna with a quarter-wave matching stub. Ferrite beads isolate the antenna from the feedline, providing a consistent match and less interaction (detuning) from nearby objects.

Construction is good, with heat shrink tubing used to cover all joints. It is flexible and does roll up to fit in a coat pocket.

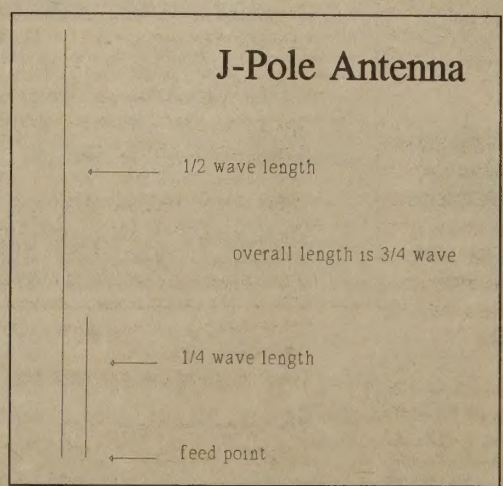

Figure 1. The basic J-pole antenna is a half-wave affair using a quarter-wave matching stub.

Other Uses

Since the antenna is so small, I decided to try it with my trusty portable scanner. The scanner was set up for use on all the public service bands, including the 800 MHz band. The reception was greatly enhanced over the original rubber duck type antenna.

Using the MFJ Roll-Up for scanning could be a real help for the city-dwelling scanner buff with no place for an outdoor antenna. It would also be very handy for the traveling listener.

Recommendation

At a price of $14.95, the MFJ-1730 is a bargain and not worth trying to copy. It does an honest job and I recommend it for both 2 meter and scanner service. RF

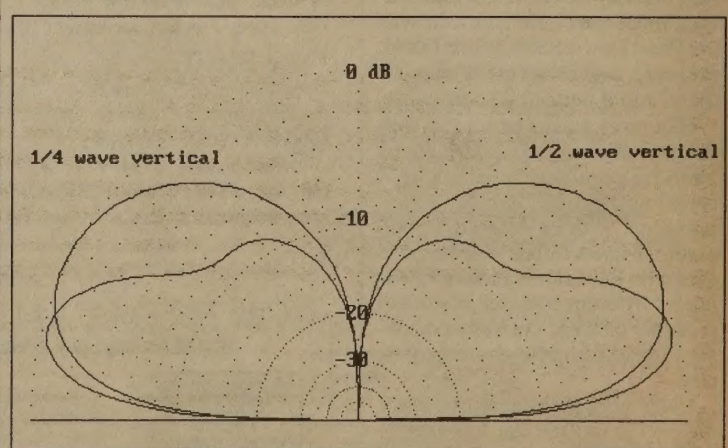

Figure 2. Plot of one-quarter single-element and half-wave J-pole vertical 2 meter antennas.

Soda Can Antenna

by Derek Leath NØPQT

I would like to share with you a design I came up with for a dual-band antenna made out of soda cans. The parts you will need are: eight cans, burglar alarm tape, a spacer of some kind (I used Plexiglas), connector (SO239, or BNC), wire, glue, and some tin foil.

First, tape four cans together with the burglar alarm tape, then do the same with the other four cans. Next, glue the first four cans onto a piece of Plexiglas or wood or plastic that is about 1/8" to 1/4" thick. Then place the other four cans directly underneath the top four and glue them as well.

After you have the cans in place, drill a hole for the connector just in front of the cans. Place the connector in the hole. Scrape some of the paint off the cans to make a good connection, then solder a wire to the top connector, place it on the scraped-off area of the can and tape in place with the burglar alarm tape. Do the same with the bottom part.

Wrap tin foil around the cans. And there you have it. A quarter-wave 2 meter and a three-quarter-wave 70cm. This is a fun basic design, and if desired you could solder the cans at a later date for a more permanent antenna. Hope you have fun making it. RF

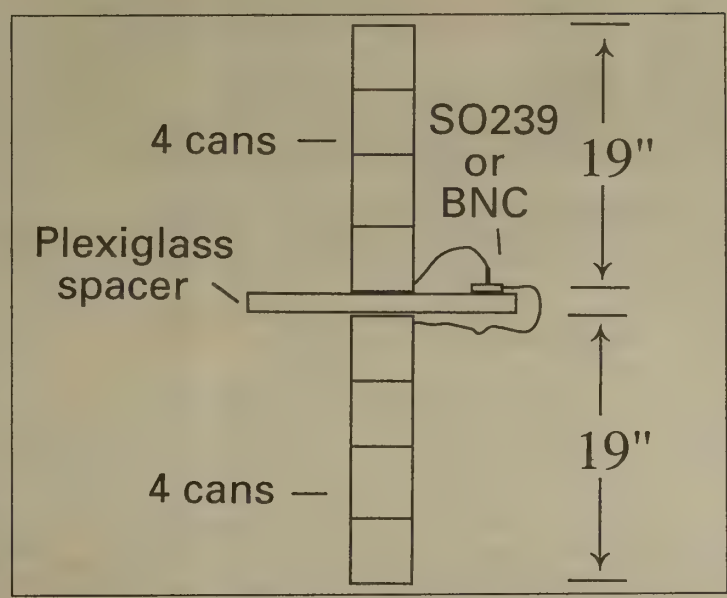

Figure 1. Construction details for the Soda Can Antenna.

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Field Day - Hawaiian Style

by Ann Shaver AH6KY

One minute our "elmers" were congratulating us on successfully completing Elements 1A and 2 for our Novice class license; the next minute they were speculating whether our licenses would arrive in time for Field Day.

"What's Field Day?" we wondered.

"You'll see," they helpfully replied.

Although we didn't realize it at the time, that was as good an answer as any. Field Day is one of those things you just have to experience firsthand. No amount of describing can do it justice! Understanding what the phenomenon is all about, however, can make Field Day less of a hassle and more fun for all involved.

Officially, Field Day is an ARRL-sponsored exercise where hams take their equipment into a public location and operate under simulated emergency conditions for 24 hours. At this annual event, held the fourth full weekend of June, amateurs practice transmitting and receiving messages using self-generated power, operating from temporary facilities. In a real emergency such as a flood, tornado, hurricane or earthquake, chances are there would be no commercial power available. Phone lines, too, would be down or overloaded. Therefore, it's important to hone one's skills operating with non-commercial power sources. During Field Day, amateurs communicate using energy derived from car batteries, gasoline generators, solar panels and the like.

There is a contest aspect to Field Day, and clubs gain points for the number of contacts made. Clubs earn additional points for operating in a public area, for obtaining publicity in the local media, for providing information about amateur radio and for increasing general awareness of the value of the amateur radio service. Operating with self-generated power multiplies the point value of each QSO.

In addition, clubs get extra points for having new hams (that is, licensed for less than one year) operate a Novice station. And that's why Chuck Burch AH6IN and Mingo Correa KH6BRN were particularly eager for us to get our callsigns in time for the big event.

As luck would have it, the coveted callsigns finally arrived in our mailbox Thursday afternoon; Field Day started on Saturday! Now we could join Chuck and Mingo and the other members of the Leeward (Oahu) Amateur Radio Club at the Field Day site, Maili Beach Park.

The words "Novice" and "amateur" never fit anyone as well as they fit us! At least we made a good team—Al was timid about the microphone but fair with the key; Ann was atrocious at the key but there was no stopping her mouth. We were walking on air Friday afternoon when we arrived at the Field Day site to help erect the antenna towers and assist with some of the other preliminaries. Instead, one's feet should be planted firmly on the ground for tasks such as pulling on lines, securing guy wires, connecting coax and the like. Chuck and Mingo showed us the ropes—literally and figuratively—and taught us to set up a complete operating site: power, transceivers, antennas and all the incidental necessities.

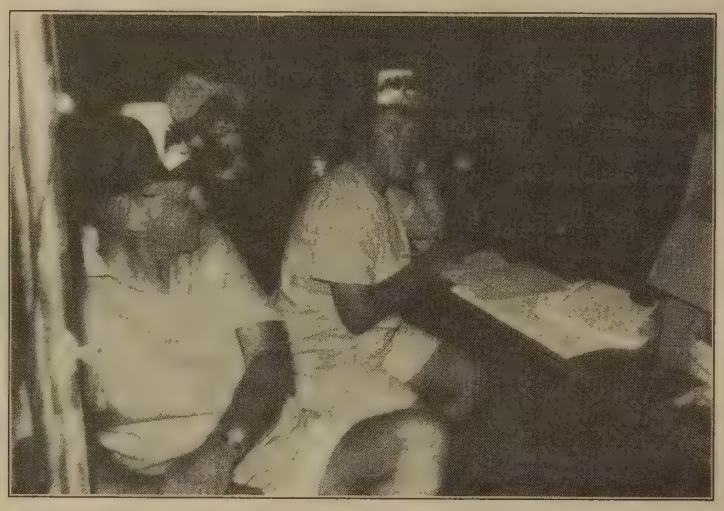

Photo A. While others operate, Al Shaver AH6KX watches Ann Shaver AH6KY use "dupe sheets" to verify the number of eligible contacts. (Photo by AH6IN.)

Photo B. Al Sadowski AH6LS operated HF phone as well as VHF digital during the 24-hour period. (Photo by AH6IN.)

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Photo C. After a long night of QSOing, Mingo Correa's breakfast seemed particularly tasty.

Photo D. Kevin Schafer WH6AQ operates the phone station. Kevin also brought his sons along to enjoy the excitement of Field Day. (Photo by AH6IN.)

The Big Day Arrives

We arrived at "Radio City" bright and early the next morning—Field Day begins at 8 a.m. in Hawaii—and couldn't wait to "tune in the world." Ten meters was slow opening that day—or so it seemed. We struggled and struggled and finally made half a dozen or so contacts. We didn't really understand how those points worked, but we were reassured that Chuck was more concerned we have a good time and develop good operating skills than he was with raking in points. He kept telling us, "Don't worry about points, we've got a lot of multipliers. Later on we'll do a lot of CW and that counts double. Besides, we've got Robo-Operator over there on 15 meter phone," Chuck added, referring to Jon Favinger WH6CAR who could exchange information and say "Aloha. Good luck with the contest," faster than anyone on the face of this earth.

We were so excited to be part of this great hobby at last. After a while, though, we began to feel guilty—maybe we weren't pulling our weight. Then Ann heard an Oregon station talking to someone in *Australia*. She shrieked at some of the club members, and they obligingly went over to rotate the beam, using the good old "Armstrong Rotator" (if you don't know what that is, be certain to learn before Field Day!). In the process, Chuck remarked that working Australia from Hawaii was no big deal, but no one was going to deflate Ann's bubble!

After a successful contact and a friendly chat about life Down Under, Ann was sure she had done something magnificent for the Club, scoring 973 points. Triumphantly, she turned to Chuck and told him about the wonderful QSO she had just had. He nodded. How many points does Australia get us, she asked innocently, envisioning herself the Queen of the KH6MOP Field Day. "All phone contacts count one point," Chuck explained once again, "and Novice contacts count double. So that's two points."

"Well, that station said he was good for 973 instant-qualifying points," she persisted. "I mean, it was Brisbane, Australia."

"Yes, but for Field Day all phone contacts count the same!" Chuck replied with infinite patience.

We learned then that the 10/10 Club is completely separate from Field Day. We haven't yet learned, by the way, what good either Field Day or 10/10 points do anyone!

Playing Radios in the Sun

We have learned, however, what Field Day is all about. It's a unique experience, a wonderful way to learn good operating skills, and a way to form lasting friendships. Working under the supervision of the control operator, codeless Technicians get a chance at Field Day to experience the HF bands. First-timers with any class license are always welcome, but it is a good idea to understand what the event is and to have some idea of "Field Day" etiquette.

Before deciding to spend Field Day with a particular club or group, find out a little about them. Are they there to enjoy playing radios in the sunshine or are they avid contesters? Everyone agrees that Field Day is a time to practice emergency preparedness, but some groups take the contest aspect more seriously than others. Our Leeward Club definitely puts having fun and learning good habits ahead of amassing points. We always do very well in the standings published in the November issue of *QST*, but that's because we make careful use of all those multipliers mentioned earlier. Operators are not discouraged from rag-chewing or "talking story" (Hawaiian for gabbing). Families are welcome, and hams regularly bring children, parents and friends along to join in the fun.

Not all Field Day clubs share this attitude, however. Many feel that the club picnic is the time to socialize and Field Day is a chance to compete in a unique, national event. There's a lot of validity to that notion, too. So before showing up at a local Field Day site, try to learn a little about the group's emphasis and orientation. No doubt there are several Field Day programs within easy range of your QTH; find the one that best suits your style.

Planning for Field Day

A successful Field Day requires a lot of planning and preparation. Of course, operators and equipment have to be lined up, but there are many other, less glamorous details to be handled. A site has to be selected—and after it's chosen, perhaps formal permission is needed. Usually tents or some other form of shelter must be set up. Most people get hungry in less than 24 hours! Someone needs to make media contacts and provide information and explanations about amateur radio to visitors who stop by. Antennas, transceivers, power supplies, tables, chairs, lights and other necessities must be set up and taken down. Find out who normally does these tasks—and if they can use a little help.

No matter what friendly amateurs say, Field Day isn't free. Gasoline to run the generators, food, logging sheets, insect repellent, and the like all cost something. Be quick to volunteer to contribute to the club coffers, make a gasoline run, order a pizza (NOT via the local repeater's phone patch!) or do whatever is necessary. After all, the organizers can't say "no" if you don't offer.

Explore Different Operating Modes

Don't hesitate to use Field Day as an opportunity to learn about different operating modes. Last year Al Sadowski AH6LS and Kevin Schafer WH6AQ set up a packet installation at our Field Day site. "Digital communications are an increasingly important part of the amateur's emergency arsenal," Al elaborated. "Accuracy and permanence are two key features. A shelter manager, for instance, may want a written record of the orders he receives."

After Al and Kevin had gotten the packet station up and running and had made a few contacts, they were delighted to introduce us to this exciting mode. An introduction is not the same thing as an operating lesson, however. Remember that most people at Field Day are only too happy to share their knowledge, but they want to have some fun, too. Like our packeteers, many who participate in Field Day are not able to make HF voice contacts regularly because of antenna restrictions and other equipment limitations at home. So later on, when Kevin wanted some HF fun, we were glad to play in the park with his two sons allowing him to copy those callsigns in relative peace.

Just as the opera isn't over until the fat lady sings, Field Day isn't over until those big towers are lowered and the site is restored to its former condition. Don't plan to leave for home at 1800Z on Sunday after the contest portion of the event closes. Part of emergency preparedness is being able to get on the air quickly. Take the time to put away all the equipment carefully so that the next time it is needed it won't take long to reassemble it and get on the air.

The final phase of Field Day consists of a bunch of paper work. Offer to assist in tallying the contacts made. "Dupe sheets" are available to determine if more than one contact was made with a particular station on a given band in a certain mode. Some groups actually use the dupe sheets during the contest, but most wait until later to figure the number of eligible QSOs. Additionally, many groups like to send out club or personal QSL cards to some of the stations worked. It's also a good idea to submit a short article to your local newspaper explaining the purpose of transmitters in the mall and antennas in the public park.

Field Day, for us, is a cornerstone for our summer plans. True, it's a bit of a hassle and it's not a gourmet's delight. The hours are long, the pay is poor, and the conditions—even at a beach park in Hawaii—leave a lot to be desired. But the fellowship and the skill enhancement and the funny experiences can't be paralleled anywhere.

Plan to join in the Field Day festivities this month. Who knows? You just might earn 973 points for your club! RF

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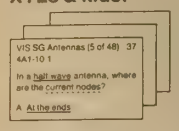

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Meteor Scatter

Meteor scatter is one of the more unusual modes of propagation for VHF and UHF signals. A meteor streaking through the ionosphere leaves an ionized trail that can last from a few seconds to over a minute. This ionized trail is so intense that you can actually bounce a VHF signal off of it to extend your range dramatically: over a thousand miles. The optimum amateur radio frequency for meteor scatter is in the 6 meter band (50 MHz), although you can use frequencies ranging from 10 meters through the 70 cm band. The higher you go in frequency, the less time the meteor trail will remain reflective to your signal. A contact that might last 30 seconds on 6 meters may only last a few seconds on 2 meters and maybe only a second on 432 MHz. Although not as efficient as 6 meters, most activity seems to occur on the 2 meter band in the CW and SSB portion (between 144.1 — 144.25 MHz).

Station and Operating Requirements

You will need an all-mode rig capable of operating SSB and CW and a directional antenna. It helps to use around 100 watts on transmit, but lower power levels will work if the meteor trail is intense enough.

Although there are meteors constantly bombarding the Earth, they are usually few and far between. However, there are certain times during the year when a meteor shower is active. These showers are usually associated with a comet debris trail that the Earth travels through and can be quite intense during their peak times and provide you with the best opportunity to make meteor scatter contacts. Another benefit to this is that a large number of stations will be actively attempting to make contacts during these times so your chances of actually hearing (or even working) meteor scatter is much greater than usual. Although it helps to set up a schedule with another station, random contacts are indeed possible during the larger showers.

Be Patient

Don't expect to hold lengthy conversations using meteor scatter. If you're lucky, you may be able to squeak a two-way contact of callsigns and signal report in one bounce. However, you'll usually only be able to hear a callsign, followed by several minutes of waiting to hear a return report. Some contacts can take up to an hour or more for just the right combination of meteor trails. If you're holding a schedule with a distant station, usually one station calls for 15 seconds at 00 and 30 seconds past each minute. The other station will reply or call at 15 and 45 seconds. You continue this schedule until all the pertinent information has been passed and confirmed (callsign, report and acknowledgement).

You don't need a superstation to hear a meteor scatter contact. I've heard quite a few signals coming in at 40 over S9 with my very modest station. Quite often you may just hear a quick burst with only a portion of a callsign (usually a small grain of sand hitting the atmosphere).

Shooting the Stars

You can use either CW or SSB to make contacts. If it's a pretty good meteor shower, you might want to turn your rig on 144.200 MHz (the 2 meter SSB calling frequency), crank up the volume and go outside for the visual show. It's quite a thrill to see a spectacular meteor streak across the sky and actually hear someone bounce off of the trail. I once heard a VE1 station in Nova Scotia (1000 miles from my Ohio QTH) come in with a tremendous signal as I watched a meteor zip across the sky and explode. The instant the ionized trail dissipated, the Nova Scotia signal stopped abruptly in mid-sentence.

The best times for the maximum quantity of usable meteor bursts are usually during the late night/early morning hours. It doesn't necessary have to be dark to take advantage of a meteor shower. During the last big Geminid shower in December of 1991, a two hour period in mid-morning (9 to 11 a.m.) was so intense that it was possible to make almost continuous contacts.

Your Guide to the (Shooting) Stars

To maximize your chances to participate in this fascinating mode, it helps to know when the best meteor showers occur. The two best showers are the August Perseids and the December Geminids. Some of these showers provide you with over 100 good meteor trails per hour at their peak. The July/August time frame is particularly good since there are two good showers that run into each other to some extent. Take a look at the sidebar for a list of the best meteor showers for 1992. Although the peak days are shown, you may be able to make some contacts a couple of days either side of the peak. The peak times are shown in the sidebar for the major showers.

I hope you enjoy the thrill and challenge of meteor scatter. It's a great way to pick up some real DX that is not normally workable. RF

Meteor Showers for '92

Shower	Best Hour (EST)	Radiant Direction	Date of Maximun	Approx. Peak Rate (/Hr.)	Associated Comet
Quadrantid	5 a.m.	N	Jan 04	40-150	
Lyrid	4 a.m.	S	Apr 21	10-15	1861 I
Eta Aquarid	4 a.m.	SE	May 04	10-40	Halley
Delta Aquarid	2 a.m	S	Jul 30	10-35	
Perseid	4 a.m.	N	Aug 11-13	50-100	1862 III
Draconid	9 p.m.	NW	Oct 09	10	Giacobini-Zinner
Orionid	4 a.m.	S	Oct 20	10-70	Halley
Taurid	Midnight	S	Nov 09	5-15	Encke
Leonid	5 a.m.	S	Nov 16	5-20	1866 I
Andromedid	10 a.m.	S	Nov 25-27	10	Biela
Geminid	2 a.m.	S	Dec 13	50-80	
Ursid	5 a.m.	N	Dec 22	10-15	

Radiant Direction: Direction from which the meteors appear to originate.
Date of Maximum: Date of actual maximum occurance may vary by +/- two days.
EST = UTC-5 hours.
[TNX to WX2L @ WX2L.#SNJ.NJ.USA.NA and SpaceNews *de KD2BD for the above chart.]*

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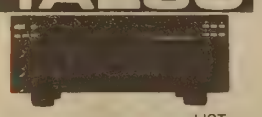

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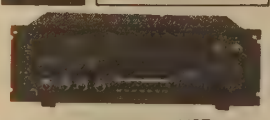

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the tech side

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If the series pass transistor is a discrete part (most are), then you can pull it and check it for shorts. If it's part of a regulator IC, your task is not much harder. Just pull the IC and use your ohmmeter to check for shorts in the same way as you would with the transistor. Be aware, though, that it is possible for an IC to look OK on the ohmmeter and still be bad. My experience has been that IC regulators open but rarely short.

Gimme Support

Discrete regulators can have various supporting parts, including zener diodes (special diodes used to establish absolute voltage references), driver transistors and even IC op amps. The transistors can be checked, out of circuit, with your ohmmeter. The zener diodes are a bit trickier. To check a zener, you must know its voltage rating. Often, the rating will be shown on the supply's schematic, or you can look it up in a semiconductor book of the type available at Radio Shack. Take a 1k ohm resistor and put it in series with the positive wire of any DC supply rated higher than the zener's voltage rating. A little wall cube supply will do fine here. Now, connect the other side of the resistor to the cathode (banded) end of the diode and connect the supply's negative wire to the other end. (This may seem backward, and it is. Zeners are deliberately connected opposite to the way normal diodes are used.) Connect your voltmeter across the diode and read the voltage. If it is close to the part's voltage rating, the zener is good. If it is way too high or low, it is bad and should be replaced. If you suspect an op amp, it is best to try a new one. Luckily, most of them are pretty cheap.

The output filters in some supplies contain inductors. These are just coils of wire wrapped on an iron core, and they may look much like the power transformer. If the coil shorts to the core, the resulting short will blow the fuse. Check it the same way as you checked the power transformer, but be sure to disconnect both ends of the inductor from the circuit first, to avoid confusing the reading. An inductor whose windings are shorted to themselves, but not to the core, will greatly increase the hum on the supply's output, but it shouldn't cause catastrophic failure.

Next month, we'll tackle supplies with open circuits and also take a look at crowbar circuits, switching supplies and switching regulators. Until then, remember: BE CAREFUL! 73 from KB1UM. RF

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CIRCLE 101 ON READER SERVICE CARD

the tech side

by Michael Jay Geier KB1UM

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Unlike in the water analogy, electrical power has to go somewhere. If you restrict the flow through the application of resistance, the power resisted gets wasted as heat in the resisting element. It's basic Ohm's law. If you feed 12 volts at 1 amp into a regulator and restrict it to 8 volts at one amp at the output (in a series circuit, the current is always the same at all points), 4 volts at 1 amp, or 4 watts, are being dissipated as heat in the regulator. That's why the "series pass" regulator transistor has that big heat sink on it.

Because it takes so much thermal stress, the series pass transistor is the most common failure in any linear supply. If it simply opens, the output of the supply will go to zero but the fuse won't blow. If it shorts, though, the output of the supply will go too high. This, in and of itself, will not blow the fuse, but many supplies have "crowbar" protection circuits which are *designed* to blow the fuse if the output voltage goes up too much. The idea, of course, is to protect your radio from too much voltage.

If the series pass transistor is a discrete part (most are), then you can pull it and check it for shorts. If it's part of a regulator IC, your task is not much harder. Just pull the IC and use your ohmmeter to check for shorts in the same way as you would with the transistor. Be aware, though, that it is possible for an IC to look OK on the ohmmeter and still be bad. My experience has been that IC regulators open but rarely short.

Gimme Support

Discrete regulators can have various supporting parts, including zener diodes (special diodes used to establish absolute voltage references), driver transistors and even IC op amps. The transistors can be checked, out of circuit, with your ohmmeter. The zener diodes are a bit trickier. To check a zener, you must know its voltage rating. Often, the rating will be shown on the supply's schematic, or you can look it up in a semiconductor book of the type available at Radio Shack. Take a 1k ohm resistor and put it in series with the positive wire of any DC supply rated higher than the zener's voltage rating. A little wall cube supply will do fine here. Now, connect the other side of the resistor to the cathode (banded) end of the diode and connect the supply's negative wire to the other end. (This may seem backward, and it is. Zeners are deliberately connected opposite to the way normal diodes are used.) Connect your voltmeter across the diode and read the voltage. If it is close to the part's voltage rating, the zener is good. If it is way too high or low, it is bad and should be replaced. If you suspect an op amp, it is best to try a new one. Luckily, most of them are pretty cheap.

The output filters in some supplies contain inductors. These are just coils of wire wrapped on an iron core, and they may look much like the power transformer. If the coil shorts to the core, the resulting short will blow the fuse. Check it the same way as you checked the power transformer, but be sure to disconnect both ends of the inductor from the circuit first, to avoid confusing the reading. An inductor whose windings are shorted to themselves, but not to the core, will greatly increase the hum on the supply's output, but it shouldn't cause catastrophic failure.

Next month, we'll tackle supplies with open circuits and also take a look at crowbar circuits, switching supplies and switching regulators. Until then, remember: BE CAREFUL! 73 from KB1UM. RF

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04V

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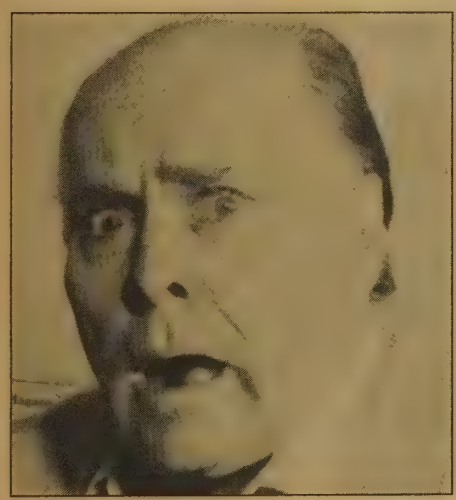

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CIRCLE 101 ON READER SERVICE CARD

computers in the shack

by Jeffrey Sloman N1EWO

Last month we took a preliminary look at the world of packet radio. This time we'll look at how to connect the pieces of a packet station, and at some packet etiquette. Before you can get a packet station on the air you've got to wire all the pieces together. Unless you have some really strange equipment you are sure to find someone in your area who can help you get the wires straight. Still, it's a good idea to have some background about what it is you are doing—you wouldn't want to be accused of being an "appliance operator" now, would you?

TNC to Terminal

If you are among the majority, the computer in your shack is an IBM-PC compatible. Since there are so many of you out there, we'll use that as an example. The rest of you needn't feel left out; the theory is the same, only some details vary. The TNC (Terminal Node Controller) talks to the terminal—a computer or dumb terminal—by means of a serial data connection. This means that each of the smallest pieces of a data transmission—called bits—are sent serially from TNC to terminal. "Serially" means that one follows another in a line, one at a time. The serial interface used by TNCs, without fail, is known by its EIA (Electronics Industries Association) designation of RS-232D. *[Note: You may be surprised by the "D" on the end of that designation, but the familiar RS-232C has been superseded by the "D" specification for some time.]* This standard specifies the RS-232D port's pins and signals, but interestingly, not its connector. In the PC world the DB-25 or DB-9 connectors are used—25- and 9-pin D-shaped connectors, respectively.

Though the RS-232D specification has 25 pins designated, TNC connections can be made with as few as three! The three vital pins are:

• pin 2: TD (Transmit Data)

This is the pin that sends data from the terminal to the TNC.

• pin 3: RD (Receive Data)

This is the pin that receives data from the TNC.

• pin 7: SG (Signal Ground)

This is the pin that acts as a common ground for all signal lines.

You might have noticed a problem with these designations. Namely, the pins called "send" and "receive" have a "point of view." That is, they can only be called "send"and "receive" from one end of the connection—the other end believing them to be exactly the reverse. Well, this is true. So, in order to make these designations sensible, there are two types of equipment that are connected by RS-232D ports:

• DCE (Data Communications Equipment)

This is basically equipment to which a terminal is to be connected. It includes things like modems, printers, and TNCs.

• DTE (Data Circuit Terminating Equipment)

These are devices like computers and terminals that "terminate" a data link.

Which class—DTE or DCE—a particular piece of equipment belongs to is not written in stone. You find both DTE and DCE printers, for example. But, it is very likely that a modem or TNC will be DCE, and a computer or terminal will be DTE. If you have a complimentary pair like this, a straight-through cable—pin 2 to pin 2, pin 3 to pin 3, etc.—will work fine. This is the most likely type of cable to connect the TNC to the terminal. The exception to this rule is for AT class IBM-PC compatibles. On these machines you will find 9-pin connectors whose pinout varies. On the AT, pin 5 is SG (Signal Ground). To review:

The 25-pin serial cable for TNC to terminal has pins 2, 3, and 7 connected straight through.

The 25 to 9-pin serial cable has pins 2 and 3 straight through and the 25-pin connector's pin 7 connected to the 9-pin connector's pin 5.

Serial cables can be expensive, so making your own can save a bunch of money. Besides, it will give you a chance to learn soldering—an essential ham skill. The connectors you will need are readily available at the local Radio Shack or parts store. If you have a local specialty dealer, by all means shop for your parts there! I'll take this opportunity to suggest that it is in your best interest to pay a reasonable premium—say as much as 10%—to buy ham radio equipment and parts from a local ham dealer. Radio Shack will be there tomorrow, but if you don't buy from your independent specialty stores, they won't be.

If you have never soldered anything before, get on your local repeater and ask for help. There are plenty of hams out there who want to help you get started with the technical side of the hobby—later you can return the favor by answering the call for help from another ham. You can use almost any decent quality cable; telephone "quad"—the four-conductor stuff that runs in the walls—will work fine, and is easy to get.

TNC to Radio

This connection can be a little stickier, and we don't have enough room here to go over all the possibilities. So let's look at the most obvious thing, connecting a hand-held radio to a TNC. The TNC needs three types of connections:

• Receive Audio

This is the signal that normally comes from the radio's speaker. The usual place to get this for the TNC is from the earphone jack.

• Transmit Audio

This is the signal that normally goes to the radio from the microphone. The TNC produces audio it wants to transmit to remote TNCs. This signal is usually sent to the transmitter through the mike jack.

• PTT (Push to Talk)

This is the signal that tells the radio to key the transmitter. On a handheld, it is usually generated by the PTT switch on the side of the radio. This can be the most confusing connection.

Each TNC has a different type of connector with these signals on it. Some use DB-9s, like an AT serial port; others use mini and sub-mini phone connectors, of the same type used on your handheld. The audio connections—transmit and receive—are usually very easy. The PTT connection, though, can be complicated.

In the old days of radios PTT connections were usually simple switch closures. That is, a simple NO (Normally Open) switch was connected to some pins in the mike connector, and when the switch was closed, the transmitter keyed. With the advent of really small handheld radios—and their limited "real estate"—schemes to save those pins were devised. Nowadays, the most common way to key a handheld is by letting a tiny DC current pass from one side of the mike line to the other. To make this clearer, most handheld radios use tiny electret—or condenser—mike elements. These are little capacitors with one plate made flexible and exposed to the sound to be picked up. When the flexible plate moves, the capacitance changes; a tiny circuit inside the microphone changes the capacitance to AC (Alternating Current) which is what the transmitter wants for audio.

Because this technique requires power, a small DC current is applied to the mike element. It is this current that is used to key the transmitter. If a relatively large resistor—3k to 10k for most handhelds—is placed across the mike line, a tiny DC current flows. This is detected by the radio's microprocessor which puts the transmitter on the air. The practical result in the case of connecting the radio to the TNC is that the PTT connection is made to the mike connector—in addition to the transmit audio—and an appropriate resistor must be placed in series with the connection. Some TNCs require internal jumpers be set or removed for different PTT circuits. Again, get on the local repeater and ask for help—there will be at least one person who knows your radio and TNC combination.

Packet Etiquette

There are a few things that you should keep in mind when you make your way into the world of packet. Like all operating modes, there are rules of good behavior that will help make you and those around you happier.

Beacons

TNCs allow automatic beacons, which transmit a message at a specified interval. Beacons can be a good thing, or a terrible annoyance. A beacon helps people find your station—they need to know you are there before they can talk to you. It also helps people to determine propagation. I like beacons, they let me know who is out there. If you are going to use a beacon check these points:

• Set the interval high—probably as high as possible.

• Keep the text short and simple; include your QTH—and maybe your name.

• Don't use a digipeater! The utility of your beacon is to let those around you know you exist, not everyone in the coverage of the biggest digi in the area.

Packet Messages

Many hams really enjoy reading the packet messages that are forwarded among the PBBSs. When composing your own messages, there are a few important things to keep in mind:

Addressing: This is the most abused area in packet. Packet message are addressed: call@PBBS. A group name—such as SALE or YAESU—can be substituted for public bulletin postings. Make this entry meaningful—look at how others are addressing their messages. The PBBS in the address can be a single BBS, your regional network, ALLUS—for the entire United States, or even WW for World Wide. It is the ALLUS address that is most frequently abused—use it sparingly! Bulletins offering towers for sale, but addressed to ALLUS, just make the ham who sent them look silly. How likely is it that a ham in California will travel to Maine to buy a 70-foot tower? Even requests for help should be carefully addressed. Try your region first, then escalate to ALLUS if you can't get help there.

Subject: Even though the subject line is short, try to make it as descriptive as possible. For example, if you need help with an external mike on a Yaesu handheld, don't use a subject line like: handheld. This tells nothing about the content of your message. It won't get read. Try something like: FT-411 ext mike help. This line makes it possible to determine whether the message is of interest.

Content: There are even some things you can do to make your messages more comfortable to read. First, if you can avoid it at all, don't use ALL CAPS. This looks like you are yelling, and it is harder to read. Also, try to keep your messages to about 60 columns—if you go more than this, formatting can get messed up. Finally, don't double-space. If you can figure out how, compose your messages offline. That is, use a text editor or word processor to write your messages. This will give you a chance to edit and spell-check your writing. Write as if you were having a conversation—don't get fancy. Then go back over the message and clean up anything you don't like the sound of. This will make your messages much more popular on the packet network.

The above are just some suggestions; there are other things that you will figure out for yourself. It's easy to be a good packet operator if you keep the idea of courtesy in mind. I want to know what you think! Please write to me here at *Radio Fun* and let me know about what you are doing with computers in your shack, and what you would like to see here. Till next month—73 de N1EWO. RF

updates

Computers in the Shack

In the July 1992 column of "Computers in the Shack," the sentence reading, "The TNC's job as PAD involves packaging the user's data into another type of frame—the data frame." should read as, "The TNC's job as PAD involves packaging the user's data into another type of frame—the information frame (also known as the I-frame)." RF

Worked All North Dakota Counties Award

The Theodore Roosevelt ARC is sponsoring a "Worked All North Dakota Counties" certificate. This document will be available to ham and SWL enthusiasts alike. For more information and an application form send a number 10 SASE to TRARC, P.O. Box 1854, Dickinson ND 58602, or to Steve Allar NØELA, 1701 6th Ave., N.E., Beulah ND 58523. *TNX Westlink Report #626, May 28, 1992.*

Most Accurate Clock

Hewlett Packard's new atomic clock, introduced just a few months ago, has achieved the status of being the most accurate mass-produced timepiece in the world. The HP 507A cesium clock loses only one second every 1.6 million years, but at $54,000 each only scientists, navigators and some governments are expected to buy it.

Some of the world's standard timekeepers use HP atomic clocks, including the US Naval Observatory in Washington, the National Institute of Standards and Technology, the Observatoire de Paris, the National Physical Laboratory in England and the Physikalisch-Technische Bundesanstalt in Germany.

But HP's new atomic clock isn't fail-safe. The company predicts one failure every 10 years or so and provides only a five-year limited warranty.

"I don't think anyone expects a product to last 1.6 million years," said spokesman Al Thorne. "But if it did, our clock would only be a second off." *TNX Westlink Report #621; "The Mike and Key" Vol. 56 #6, June 1992.*

New Battery for Electric Cars

Ford, Chrysler and General Motors have been working for dozens of years to develop an electric car with enough power to satisfy consumers without using all available space for the batteries. But just a few weeks ago, the three auto makers, in concert with the federal government, went outside industry engineering in order to beat out the Japanese and Europeans who have also been gearing up for a nearly pollution-free car.

The Ovonic Battery Company claims that its nickel-metal hydride battery will power a small car at least 300 miles on a charge while providing acceleration of 0 to 60 miles per hour in eight seconds. The Troy, Michigan, company, which has fewer than 60 workers, contends that a car using its prototype battery will be able to hit a top speed of 100 miles per hour, last for 100,000 miles, and take a recharging in fifteen minutes. In addition, the battery is made of materials which are nontoxic. An added benefit is that it is believed that operating the electric car will actually be less than half as costly as running a standard gasoline powered vehicle.

Ovonic scientists chose amorphic materials rather than single metals or simple alloys for use in the electrodes, thus departing from standard battery design. The atoms in these Ovonic electrodes are deliberately positioned in a disordered manner, much like the company's holding company Energy Conversion Devices, Incorporated's highly successful solar cells. *TNX to Westlink Report # 627, June 15, 1992.*

Modems Without a Phone

The FCC has allocated a range of frequencies for commercial use in wireless public-radio-data networks. A radio-data modem, which is a transceiver, can be attached to a personal computer to exchange data with any other computer in the country. The new modem is Hayes-compatible.

The benefit of a wireless data link comes from bypassing the nation's telephone lines. Instead of a long-distance call, a user can establish a direct link over radio waves. And, just like packet radio, messages and data may be stored for later retrieval if the receiver is not at the computer at the time. *TNX to W5YI Report, June 1, 1992.*

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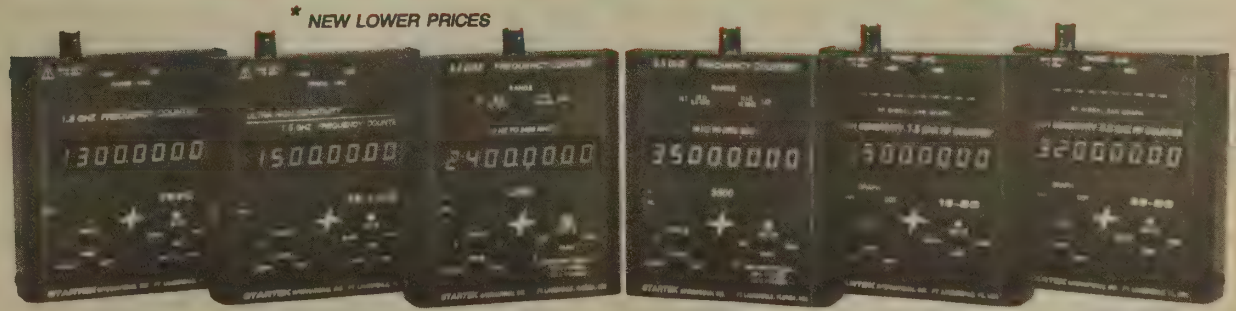

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CIRCLE 247 ON READER SERVICE CARD

upgrade don't stop now

by Gordon West WB6NOA

Your First Test With Two Ham Buddies

There may be only a few "shopping days" left to begin your amateur radio career with two local ham buddies giving you the test. For decades, including right now, it has been possible to join the amateur radio ranks by taking a test in front of any two ham friends who live nearby. A recent ARRL and W5YI petition to bring entry-level Novice testing into the VE program will soon be acted on by the Federal Communications Commission. It could mean the end of the traditional two-buddy test system of administering the entry-level Novice class license exam.

But, for the time being, you can still be tested by those two ham friends as long as they meet the following criteria:

•Both friends must hold a current FCC-issued General class license, or higher grade;

•Each must be 18 years of age or older;

•Your two friends may not be employees of an amateur radio dealer;

•Neither of the ham friends giving you the Novice test may have ever had their license revoked or suspended; and

•Your two friends may not be related to you in any way.

Chances are your two licensed ham friends with General class licenses or higher are perfectly qualified and completely legal to give you your entry-level Novice test. But guess what—chances are your two ham friends have absolutely *no* idea of how to actually administer the examination to you! They will probably ask YOU how to give the Novice test!

Have your two ham friends contact *W5YI Publishing, P.O. Box 565101, Dallas TX 75356* for a catalog of testing handbooks and guides for the volunteer examiners. Now, some of these guides are for accredited volunteer examiners—but there are also several pamphlets on how two ham friends may develop their own Novice code and theory examination, independent of a volunteer-exam-coordinated accredited exam. If you're thinking of getting your ticket with two ham buddies, write for the information today!

You might also obtain a copy of FCC 610 instructions. These are also part of the W5YI material that is available to you as a new Novice applicant. The instructions tell all!

But here are some things that might help *you* get through that entry-level code and theory examination.

Tips for a Successful Exam

Your two ham buddies could actually read you the 30 Novice questions and ask you for a paraphrased answer. The test doesn't necessarily need to be written, nor does it necessarily have to be multiple choice. If you have a disability, this might help.

Your two ham friends might make up their own Morse code examination especially for you. The Element 1A Morse code test must use all the letters of the alphabet, numerals 0-9, the period, the comma, the question mark, slant mark, and prosigns AR, BT and SK. Your code test will be sent at 5 wpm, and the character rate may be completely up to how your two examiners wish to send you the test.

It's easier to send code than to receive. FCC Rule 97.503(A) points out that a sending test might also be incorporated along with the receiving test. This might help you *up* your score!

You don't need to score 100 percent on the code or the theory to pass. Your two friends will ask you 30 questions about the Novice class operator license, and to pass you must answer 22 questions correctly. As for the code test, you simply need to "prove" that you have the ability to send correctly by hand, and to receive correctly by ear, texts in the international Morse code. It's up to your two ham friends to decide how they want to judge your competence.

If you should pass the code but bomb the theory, your two ham buddies can still sign off a portion of your 610 form. This gives you credit for what you successfully passed, even though you didn't completely pass your Novice examination. "If the examinee does not qualify for the Novice operator license, but passes Element 1A or 2 . . . (d) return the application to the unsuccessful examinee." This now gives you credit for either the code or the theory, and you may take the completed form, valid for a year, to other examiners or a VE-accredited exam session, and receive the credit for what you did pass in front of your two ham friends. Most volunteer-examiner-accredited groups will honor this method of getting through your Novice license, but occasionally you may bump into a VE group that takes exception to your half-pass 610 paperwork.

If you are successful in passing both the code and the theory for Novice, let your two ham friends fill out the FCC Form 610 and prepare it for its journey to the FCC (1270 Fairfield Rd., Gettysburg PA 17325).

Fill Out the Form Correctly!

IMPORTANT: Make sure your two ham friends look at the example of a properly filled out 610 form in the W5YI material or the Gordon West theory books. It's real easy to miss a couple of tiny little boxes at the top of the form that must be checked off. If your form gets back to the FCC and is "defective" because a single little check mark was left off, your license could be delayed by as much as two additional months!

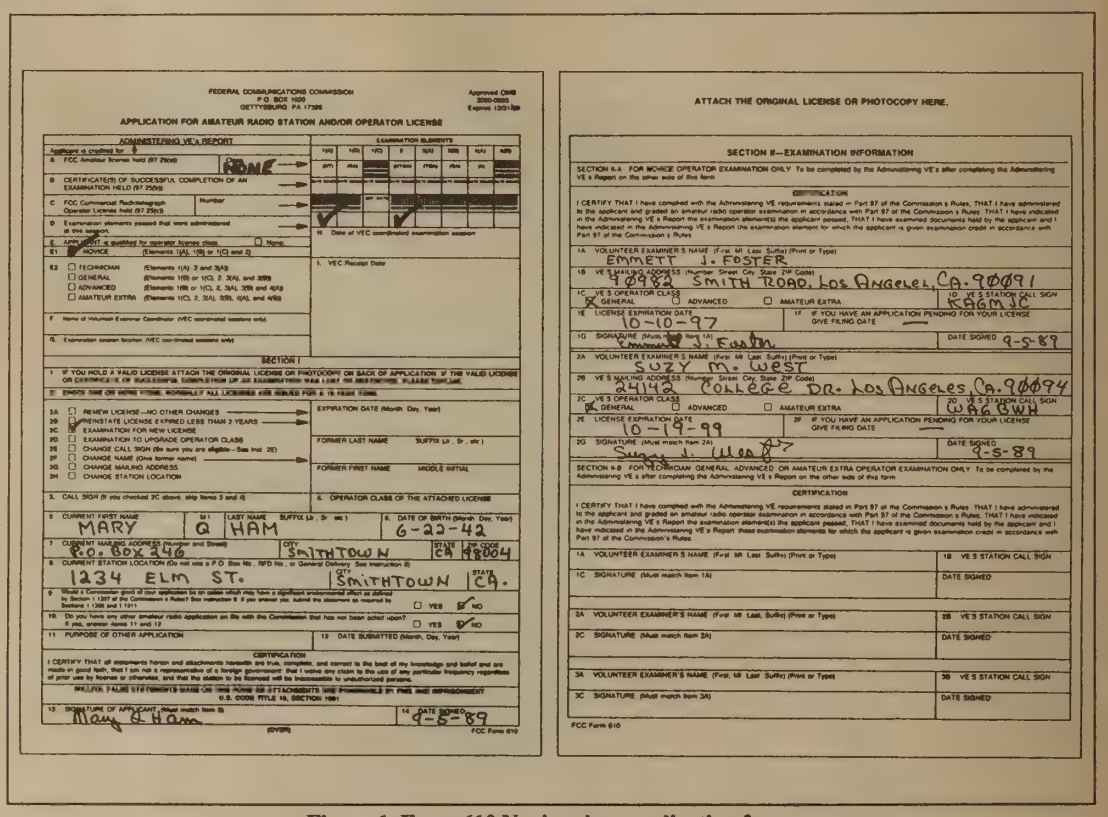
Since your two ham friends have probably never given a Novice test before, carefully double-check that every last item on the front and the back of the Form 610 was properly filled out according to the W5YI instructions to the two Novice test-givers.

This is one reason why the ARRL and W5YI are petitioning the FCC to bring the Novice testing into the VE program. Over one-third of incoming "ham buddy" Novice 610 forms are incorrectly completed. In contrast, less than a fraction of one percent of accredited VE-filled-out forms are in error. This is the beauty of the VEC program—everyone who gives the examinations is well qualified. Although your two ham buddies are more than willing to give you the test, they could use your help in showing them how the Novice class examination may be administered.

If the two petitions go through to eliminate "ham buddy" Novice class testing, the accuracy of FCC paperwork will go up, dramatically. It will also end compromised "ham buddy" Novice testing—a rare occurrence, but one that presently goes unchecked.

But the elimination of "ham buddy" Novice testing may severely restrict where new applicants can go to find a local VE-administered ham test out in the boonies. Maybe we need to comment to the FCC that rural areas of the country should be on local VE testing team ranges and be exempted from the rule.

But for the time being, obtaining your Novice examination through two ham friends is a viable and friendly way to go. If you're thinking of the test, but have been reluctant to seek out a credentialed volunteer examination team, then try a couple of ham buddies with a General class license or higher. If they meet the criteria, you are all set to join the fabulous world of amateur radio. RF



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APPLICATION FOR AMATEUR RADIO STATION AND/OR OPERATOR LICENSE

ADMINISTERING VE's REPORT

SECTION I

SECTION II—EXAMINATION INFORMATION

ATTACH THE ORIGINAL LICENSE OR PHOTOCOPY HERE.

Figure 1. Form 610 Novice class application form.

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CIRCLE 110 ON READER SERVICE CARD

radio magic

by Michael Bryce WB8VGE

Scanners as Signal Generators

Last month I mentioned using a really cheap signal generator. With this device you can generate a substantial signal from the very high end of 10 meters all the way up to the UHF bands. It's called a scanner. Yup! Your friendly programmable scanner will work just fine for a signal generator.

There are some drawbacks when using a scanner for a signal generator. Namely, you can't modulate the signal. All you'll get is a carrier. You can't reduce the signal, or attenuate it either. You can get around this to some degree by removing the antenna from the device you're troubleshooting or by moving the scanner away from the testbench. Here's how it works.

Most scanners (about 90 percent, I'd guess) use an IF (Intermediate Frequency) of 10.7 MHz. Since the scanner, like just about all radios, has a local oscillator to mix the incoming signal to produce the desired frequency, we can use the same local oscillator to produce a signal anywhere we want, as long as the desired signal is within the frequency range of the scanner.

Don't think for a minute the local oscillator is too weak to be heard. If you have ever done any weak signal work on 2 meters you know very well the strength of the scanner's local oscillators. In fact, we can use the scanner to our benefit when we work CW on 2 meters.

OK, then how do you use the scanner for a signal generator? Well, don't worry about opening up the scanner or heating up the soldering iron. We'll do it all from the front panel of the scanner. (This system won't work with crystal-controlled scanners unless you have a huge pile of crystals.)

Let's say you have picked up an old Link receiver, one that someone converted to 2 meters, for a song at a hamfest. I had a Link receiver on 10 meters when I got my Novice ticket way back when. It worked very well and I enjoyed it from the start, listening to 29.6 FM.

The procedure is simple. If you want a signal on 146.52, you simply program in 146.52 plus the 10.7 MHz local oscillator frequency. So, add the two together and you'll get 157.22 MHz. Program this frequency into your scanner. Of course, you don't want the scanner to scan, so be sure you have it set for manual, or whatever, so it won't scan. See how simple this is: Just program the scanner with the desired frequency, plus 10.7. (This won't work with a scanner that has a different IF frequency unless you know what the oddball IF frequency is.) For a signal for 29.6 MHz, punch in 40.3 MHz. That's the total of 29.6 plus the 10.7 IF frequency.

In both examples, you'll end up with a carrier on the desired frequency. As I said before, you can't reduce the strength of this carrier. If you need a weak signal, remove the antenna from the device you're testing or move the scanner away. Although very crude, I've used this method many times to rough-tune a receiver.

I mentioned weak signal CW work on the low end of 2 meters earlier. We can use the scanner for a little bit of counter EMI.

Living in a city, there are scanners running all over the place, most listening to the local police departments. If the scanner has a priority channel, you can bet the fleet it's got the local PD programmed in.

To put the stops to the interference caused by the scanners on the low end of 2 meters, just tell the scanner you want a carrier on the police frequency. Not to worry—it won't interfere with the police, as the range is only about a block or so. I just program in the frequency—all my neighbors' scanners "lock up" on their priority frequency and I have a clear frequency to work on 2 meters. After I'm done on 2, I simply re-program my scanner.

Get to Know Your Equipment

As you can see, it does not take a fully-equipped lab to fix one's own equipment. In fact, just being able to do some of the simpler things may save you a ton of money in the long run. Know your limits, but always keep expanding. I still turn green if I'm asked to work on an HT. I don't like them, and don't want to work on them. But I've also been known to open one or two up to troubleshoot.

Most of the transceivers on today's market have what is known as house parts. These parts may be as common as a 2N2222 transistor, but they're not marked as such. The transistor's case may have some numbers like "384 we89" L stamped on it. This means nothing to me, but somewhere, someone knows it to be a 2N2222. In the case of a transistor, you can make a 50 percent call if you don't have the schematic or don't know what kind of transistor it is. It's got to be either a PNP or an NPN.

But what about the ICs? These can be killers. I had to work on our club's IC735, just to replace some dial lights. All the chips in the radio had special ICOM numbers. You'll not be able to get these at Radio Shack. Most are 64-pin LSICs (Large Scale Integrated Circuits) and require special handling to remove and replace.

That's just about all the space this month. If you have a question or an idea for "Radio Magic," please drop me a note or let the editors of *Radio Fun* know and they'll pass it along to me.

Next month, we'll look at kit building and testing of radio kits. Until then, enjoy the magic we call radio! RF

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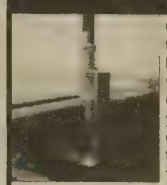

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VSWR at resonance is typically 1.5:1 or less
Power rating is 200 Watts P.E.P. Unity gain 140-170 Mhz; 2.5 db gain 440-470 Mhz; Weight is approx. 1lb.; Color: Black; Impedance: 50 ohms

$23.95 MODEL # T270M
MODEL # T270MBN
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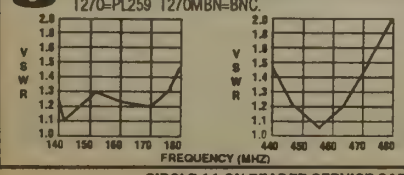

CIRCLE 11 ON READER SERVICE CARD

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BP-8	8.4v	800mah	$21.00
BP-22	8.4v	270mah	$22.00

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PB-21H	7.2v	600mah	$15.00
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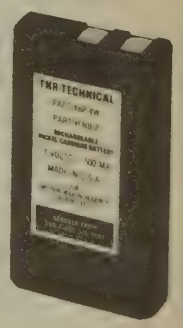
FNB-14	7.2v	1000mah	$48.00
FNB-14S	7.2v	1400mah	$59.00
FNB-17	7.2v	600mah	$35.00



*FNB-2 10.8v 500mah $19.00

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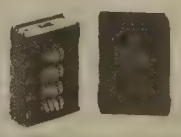

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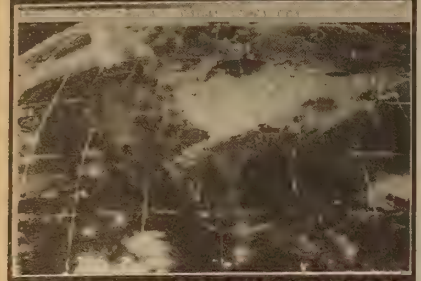

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activities calendar

Send your announcements to: Radio Fun Activities Calendar, 70 Route 202-N, Peterborough NH 03458. We'll print as many as space allows, on a "first come-first listed" basis.

ANNOUNCEMENTS

PROVIDENCE, RI The NN 1 U Testing Group will conduct VE Exams every 2nd Thursday of the month at 7 PM at the American Red Cross Bldg., 150 Waterman Ave., Providence RI. Walk-ins. Bring a picture ID and one other ID, your license and copy, same for CSCE that you need to upgrade and a copy of Form 610 submitted for Novice license. NN 1 U Testing Group will administer the test to handicapped persons, in their home, within 30 miles of Providence. If necessary, contact ***Judy KC1RI, (401) 231-9156.***

BOULDER, CO The Boulder VE Team will conduct VE Exams the 2nd Monday of most months at St. Mary Magdalene Episcopal Church, Heatherwood Dr. and Cambridge St., Boulder CO. Please bring a picture ID and one other ID; a check or money order payable to "ARRL-VEC" for $5.40; the original of your current license, if any; originals of applicable Certificates of Successful Completion of an Examination if you claim credit for any test elements; a copy of the FCC 610 you submitted if you claim credit for a Novice license not yet received; soft pencils and a calculator. For info, and to pre-register, call ***Barbara McClune NØBWS, (303) 530-2903.*** Pre-registration is preferred, but walk-ins are welcome.

AUG 2

SUGAR GROVE, IL The Fox River Radio League's 1992 Hamfest will be held at Waubonsee Community College, Rt. 47 at Harter Rd., Sugar Grove IL (5 miles NW of Aurora), starting at 8 AM. Set-up Sat. after 7 PM and Sun. 6 AM-8 AM. Flea Market. VEC Exams at 10 AM. You must bring your original FCC license, a copy of your FCC license, and a photo ID. Advance tickets $4/3 stubs; at the gate $5/1 stub. Indoor tables $10/8'. Free parking. Camp grounds nearby. Free Tailgate spaces. Talk-in on 145.470 -600 W9CEQ. Commercial vendors please call ***(708) 584-1806*** for info. Advance registration deadline is July 15th.

RANDOLPH, OH The Portage ARC, Inc., (ARRL affiliated) will sponsor its 7th annual Hamfair at the Portage County Fairgrounds, just off Interstate 76 between Akron and Youngstown. Gates will be open from 8 AM-4 PM. Advance tickets $3, $5 at the gate. Children under 12 free. Flea Market $3 per space. Indoor tables $8 ea. Computer hobbyists welcome. Talk-in on 145.39 (negative offset). Contact ***Joanne Solak KJ3O/8, Portage ARC, Inc., 9971 Diagonal Rd., Mantua OH 44255. Tel. (216) 274-8240.***

ESCANABA, MI The Upper Peninsula Hamfest/Computer Show, sponsored by The Delta County ARS Inc., will be held from 9 AM-6 PM EDST at the Escanaba Area High-School. The Delta County Tourism & Convention Bureau, Elks Lodge, and Delta County Chamber of Commerce, are co-hosting this event. ARRL sanctioned. Packet, ATV, model airplane demos. Set-ups 6 AM-9 AM. Provide your own power cords, lighting equip., and literature. Each vendor will be expected to donate prizes for the half-hourly raffle from 9 AM-4 PM. The show will provide tables, chairs and benches, electrical outlets (first come, first serve). There is an application fee of $50 per vendor per entry. Tables $6 ea. Outside Flea Market $6 per auto-sized space. For info contact ***Hamfest Committee, D.C.A.R.S., PO Box 923, Escanaba MI 49829.***

AUG 8

HUNTINGTON, WV The Tri-State ARA, Inc. VE Team will sponsor VE Exams starting at 10 AM at Our Lady of Fatima church school class rooms, located at 545 Norway Ave., Huntington WV. All test sessions will be W5YI testing sessions. (**This date and location is tentative, please call for confirmation.**) Candidates for new or upgrade licenses should bring a photo ID, copy of current license or original CSCE, and a completed Form 610 (Form 610 will be available at the test session). Walk-ins OK. Arrange to arrive by 9:15 AM in order to register and have ID and Form 610 checked prior to examination. For info contact ***Jim Baker K8KVX, (304) 736-6542.***

BEND, OR The Central Oregon Radio Amateurs will hold their 3rd Annual Hamfair at Sunrise Village at Mt. Bachelor, SW of Bend, from 9 AM-4 PM. Free secured overnight parking for self contained RVs. VE Exams from 9 AM-Noon, pre-registration only. Send FCC Form 610, a copy of current license if applicable, and a check for $5.40 payable to ARRL/VEC to: ***CORA, PO Box 723, Bend OR 97709.*** Deadline is July 15th. Flea Market. Presentations. Seminars. Advance tickets $5 by July 15th; $7 at the door. Tables $10. Tailgate $2. For tickets/info, contact ***Don Harrington N7ION, 69706 W. Parkway Meadow, Sisters OR 97759. Tel. (503) 549-7951.***

AUG 9

PEOTONE, IL The Hamfesters RC, Inc., will sponsor their 58th Annual Hamfest/Computer Festival at the Will County Fairgrounds from 6 AM-3:00 PM (exhibits open at 8 AM). Set-up Aug. 8th from 6 PM-Midnight. Commercial exhibitors welcome. Reservations close July 20, 1992. Electricity available outside the Exhibit bldg.; $10 plug-in fee by Fairground. Donation $4 advance, $5 at the gate; under 12 years free. Talk-in on 146.64-STARS and 146.94- KARS. For reservations send SASE and check to ***David F. Brasel NF9N, 7528 W. 109th Place, Worth IL 60482. Tel. (708) 448-9432.***

FRANKFORT, KY The ARRL Central Kentucky Hamfest, co-sponsored by the Bluegrass ARS, Inc., and the Capital ARC, will be held from 8 AM-4 PM at Western Hills High School, Exit 53 off I-64, Frankfort KY. License Exams, technical forums, commercial exhibits, are in air conditioned facilities. Outside Flea Market space, free with paid admission, for each person over 12 years of age. Tickets $5 in advance, $6 at the gate. Tables in commercial vendors area are $15 each if prepaid before July 15th, $25 each after July 15th. For info, tickets, SASE to ***Bobby Rolph KB4QNR, 2117 Winterberry Rd., Lexington KY 40504*** or call ***(606) 278-7570 eves.***

AUG 15

AMARILLO, TX The Panhandle ARC will hold their annual Golden Spread Hamfest at the Amarillo Civic Center, 400 S. Buchanan (in downtown Amarillo) on Aug. 15th. Handicapped accessible. VE Exams. Advance tickets $6, $7 at the door. Tables are $5. Call ***Leland Carpenter N5VRN, (806) 352-8759***, or write to ***Golden Spread Hamfest, PO Box 1524, Amarillo TX 79105-1524.***

AUG 15-16

ALBUQUERQUE, NM The Duke City Hamfest will hold an Event at New Mexico National Guard Armory, 600 Wyoming NE, Albuquerque NM. To get there, take the I-40 South Wyoming exit; the Armory is 3 blocks on the left. Swap Meet. Technical classes. VE Exams. For more info, write to ***Duke City Hamfest, PO Box 6552, Albuquerque NM 87197.***

HUNTSVILLE, AL The 1992 Huntsville Hamfest will be held at the Von Braun Civic Center in downtown Huntsville. Doors will open both days at 9 AM. Activities will all be held under one roof in air-conditioned facilities. Dealer Show. Flea Market. Technical forums. NASA Space Exhibits. Ladies' and childrens' activities. Evening banquets for the entire family. Adult admission is $5 for both days; children admitted free. Talk-in by K4BFT ("Big Fat Turkey") on 146.34/.94. Call ***(205) 880-8004*** or FAX ***(205) 534-5557*** for more info.

AUG 16

CAMBRIDGE, MA The MIT Radio Society, and the Harvard Wireless Club, will hold a Flea Market from 9 AM-2 PM at Albany and Main St., Cambridge MA. Admission $2. Free off-street parking. Covered tailgate area. Sellers $8 per space at the gate, $5 in advance (includes 1 admission). Set-up at 7 AM. For reservations and more info, call ***(617) 253-3776.*** Mail advance reservations before the 5th to ***W1GSL, PO Box 82 MIT BR., Cambridge MA 02139.*** Talk-in on 146.52 & 449.725/444.725 - pl 2A - W1XM rptr.

LAFAYETTE, IN Tippecanoe ARA will hold the 21st annual Lafayette Hamfest at the Tippecanoe County Fairgrounds, 18th and Teal Rd. (Ind 25 South). Gates open at 1100Z. Set-up Sat. 5 PM-8:30 PM. No rental tables available. Admission $4, at the gate only. VE Exams. Activities for XYLs and children. Talk-in on 146.730/.52. Contact ***Bruce Stewart N9GKE, 315 Hamilton St., West Lafayette IN 47906. Tel. (317) 463-2379.***

GEORGETOWN, DE The Sussex ARA will sponsor the Original Delmarva Hamfest at the Delaware Technical and Community College, starting at 8 AM. VE Exams. Tailgating. CW Contest, and more. Contact ***Bruce Palmer KD3WL, (302)-539-0781*** or ***Bill Hammond N3IOD, (302) 539-5780.*** Talk-in on 147.075+, 224.840.

QUINCY, IL The Western Illinois ARC will sponsor the 7th Annual Tri-States Swapfest at Eagles Alps Lodge, 3737 N. 5th St. from 8 AM-2 PM. Outdoor tailgate area. Indoor vendor tables. ARRL VEC Exams. ARRL table. XYL activities. Advance tickets $2.50, $3 at the door. Talk-in on 146.63/.03, 146.34/.94. Contact ***Jim Funk N9JF, c/o WIARC, PO Box 3132, Quincy IL 62305-3132. Tel. (217 336-4191.***

AUG 20-23

LOS ANGELES, CA The Los Angeles Area Council of Amateur Radio Clubs, and the Orange County Council of Amateur Radio Organizations, will sponsor the ARRL National Convention at the Los Angeles Airport Marriott Hotel. Exhibit hours are: Fri. 6 PM-9 PM; Sat. 9 AM-5 PM; and Sun. 9 AM-1 PM. There will be an Industry Reception on Thurs. Fri. events include an ARRL Educational Workshop and Hospitality Suites. Sat.: Breakfast $12, Swap Tables, Alternative Programs, VE Exams, Luncheon $15, Banquet $30, Wouff Hong. Sun. events: Breakfast $12, Auction, T-Hunt; make checks payable to ***HAMCON Inc., PO Box 570756, Tarzana CA 91356.*** There will be ARRL & FCC Forums, antenna and RFI seminars, DX and contest forums, T-Hunting, ATV, etc. Make your room reservations with the LAX Marriott at ***1-800-228-9290***, (be sure to mention "HAMCON 92"). There are special discount travel fares available from Corona Travel Service, Inc. (the official Convention travel agency); Californians contact ***Mark W. Costa KB6GNZ, PO Box 2100, Corona CA 91718. Tel. (714) 737-7000***—outside CA call ***1-800-322-CORP.*** Pre-registration before Aug. 1, $12; after Aug 1, $15. 16-year-olds and under, admitted free.

AUG 23

SAGINAW, MI The Saginaw Valley ARA will sponsor a Ham Radio Swap and Computer Fair at the Saginaw Civic Center starting at 8 AM. Set-up at 6 AM. The Swap will be located west of I-75, two miles along the I-675 Bypass. From Exit 2, follow the signs to the civic center. Advance tickets $2, $3 at the door. Advance tables $10, $15 at the door. Send payments with SASE to ***SVARA Swap Committee, PO Box 1783, Saginaw MI 48605-1783.*** Admission is *NOT* included with purchase of tables. Unpaid Reserved Tables will be resold at 9 AM. For info call ***(517) 781-3724.*** Talk-in on 147.240.

ST CHARLES, MO The St. Charles ARC will sponsor HAMFEST92 at Blanchette Park in St. Charles MO from 6:30 AM-3 PM. Forums and License Exams (10 AM). Free admission and parking. Handicapped parking available. Fee for Flea Market space. Dealers welcome in air-conditioned hall. Talk-in on 146.67 and

444.65 rptrs, and 146.52 simplex. Contact ***Ron Ochu KØOZ, #5 Cricklewood, St. Peters MO 63376. Tel. (314) 278-2510***, or call ***Eric Koch NF0Q, (314) 946-0948 eves.***

MARYSVILLE, OH The Union County ARC will sponsor their 16th Annual Marysville Hamfest/Computer Show at the Fairground in Marysville OH (near Columbus). Overnight camping with electric and water hook-ups will be available on a first come basis. Free entertainment Sat. night. Undercover areas and buildings for setup. 10' x 10' space $5. Commercial vendors, please act fast to reserve space. Admission $4 advance, $5 at the gate. Contact ***Gene Kirby W8BJN, 13613 US 36, Marysville OH 43040. Tel. (513) 644-0468.***

CRYSTAL LAKE, IL The Tri-County Radio Group (ARG) will hold a Radio/Computer Fest at Crystal Lake Holiday Inn. For info call ***Bob N9KXG or Ken N9KSP*** at ***(708) 658-1678 or (708) 658-3566.***

MULLICA HILL, NJ The Gloucester County ARC will hold its 15th annual Hamfest/Computer/Electronics Fair at the 4H Fairgrounds, Route 77. Advance tickets $3.50; $5 at the gate. Tailgating $5 per space. Vendors $7 per table. Electricity available. Set-up at 6 AM. General Admission at 8 AM. VEC Testing: Registration 9 AM-9:30. Testing begins at 10 AM. Talk-in on 147.78/.18 and 223.06/224.66. Enjoy our open-air Breakfast and Lunch. Contact ***GCARC, PO Box 370, Pitman NJ 08071***, or call ***(609) 478-4738.***

AUG 28-30

VERNON, B.C., CANADA The 1992 Sky High Hamfest, sponsored by the Okanagan Valley Hamfest Assn., will be held at the Silver Star Mountain and Resort area. The event will be organized by the North Okanagan RAC. RV accomodations, hotels, restaurants available. Non-Ham activities. For info, contact ***Sky High Hamfest, PO Box 1706, Vernon, B.C., Canada V1T-8C3.***

AUG 29

NEWPORT, NH Newport Area Hams will host the Sugar River Amateur Radio Summer Festival from 7 AM-4 PM. Tailgate Flea Market. VE Exams. Craft Fair. Book Sale. Special Event Demo Station. Outdoor Folk Concert at 6:30 PM. Flea Market admission: Sellers $5 (set up at 7 AM); Buyers $2 (admitted at 8 AM). Talk-in on 146.76/.16, 224.12/22.52 and 146.52. No tones, please. Contact ***Bruce C. Bedford KA1ORB, 178 Summer St., Newport NH 03773. Tel. (603) 863-1698*** or ***Bob Boyd N1CIR, (603) 863-5383.***

ROSEAU, MN The Lake of the Woods Rptr. Assn. Inc., will sponsor a Hamfest at the High School Gym, Highway #11 East. Set-up at 8 AM. Doors open at 10 AM. Buffet Banquet at 4:30 PM. VE Exams. ATV & Packet demos. Flea Market. Auction. Tables free with advance registration. Admission $10 all incl. Reservations are necessary. Contact ***David Landby KBØHAP, Rt. 3, Box 10, Warroad MN 56763. Tel. (218) 386-1092.*** Talk-in on 147.09+

AUG 30

MILFORD, CT VE Exams for all classes will be held at the Fowler Bldg., 145 Bridgeport Ave., Milford CT, beginning at 12 noon. Walk-ins welcome. For info call ***Gary NB1M, (203) 933-5125***, or ***Dick WA1YQE, (203) 874-1014.*** This testing is sponsored by the Coastline Amateur ARA.

LEBANON, TN The Short Mountain Repeater Club will sponsor a Hamfest at the Cedar of Lebanon State Park, US Highway 231, seven miles south of I-40. Outdoor facilities only. Exhibitors bring your own tables. Space available on a first come basis. Free admission. Talk-in on 146.91. Contact ***Mary Alice Fanning KA4GSB, 4936 Danby Dr., Nashville TN 37211. Tel. (615) 832-3215.***

Continued on page 25

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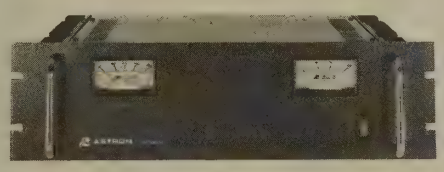
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• LOW PROFILE POWER SUPPLY						
SL-11A	•	•	7	11	2¾ x 7⅝ x 9¾	11

RS-L SERIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE				
RS-4L	3	4	3½ x 6⅛ x 7¼	6
RS-5L	4	5	3½ x 6⅛ x 7¼	7

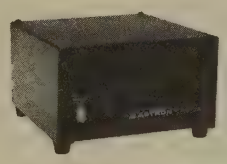


RM SERIES

MODEL RM-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• 19" RACK MOUNT POWER SUPPLIES				
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES



MODEL RS-7A

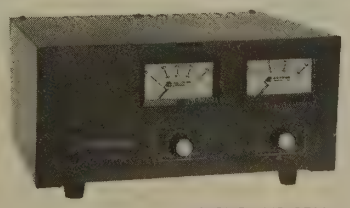
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

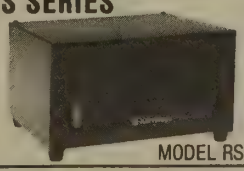


MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES



MODEL RS-12S

• Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18

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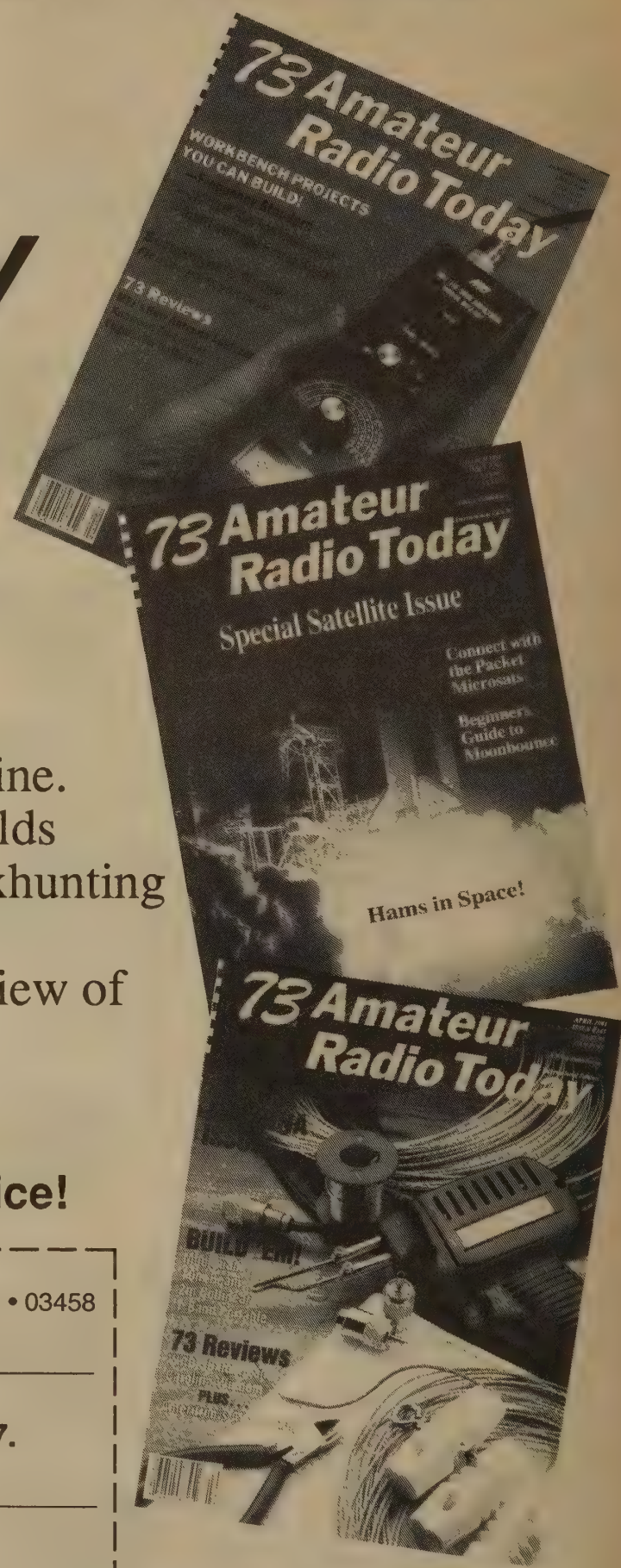

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SPECIAL EVENT STATIONS

AUG

CHANNEL ISLANDS, CA KK6EK will operate during research expeditions for the month of August, to celebrate the 15th anniversary of the founding of Cordell Expeditions, a volunteer research group that was responsible for creating the Cordell Bank National Marine Sanctuary. Operation will be SSB, principally on 20m, usually 14.328. For special expedition QSL and info, contact ***KK6EK, Cordell Expeditions, 4295 Walnut Blvd., Walnut Creek CA 94596.***

AUG 4-5

PADUCAH, KY The Paducah ARA, in conjunction with the Paducah Police Dept., will operate W4NJA, to commemorate the 1st Annual Paducah Police Dept. D.A.R.E. Daycamp. Operation will be from 1400Z-2100Z. "D.A.R.E." stands for Drug Abuse Resistance Education, and the daycamp will be looking for contacts with all amateurs, expecially other D.A.R.E. participants. Operations will be in the lower 25 kHz of the 20m phone and the lower 50 kHz in the Novice 10m phone bands. For a special D.A.R.E. QSL, send an SASE to ***John Hudson KC4HGX, 3214 Lorine Ln., Paducah KY 42001.***

AUG 4-7

BLOOMINGTON, IL The Central IL RC will operate W9AML 1700Z-2400Z Aug. 4-7, in conjunction with the McLean Co. 4H Fair. Operation will be in the General portion of 80-15m and the Novice portion of 10m. For QST send QSL and SASE to ***CIRC, PO Box 993, Bloomington IL 61702.***

AUG 8-9

MOUNT DAVIS, PA The Somerset County ARC will operate Station KC3XD from the highest point in PA, at Mount Davis. Operations will be on the Lower 50 kHz of the General phone bands of 10-80m, as conditions allow. Send QSL and SASE to ***Sherman Gary KC3XD, 708 Casselman St., Confluence PA 15424.***

AUG 11-16

SANDUSKY, OH The Firelands ARA will operate Station WB8LLY Aug. 11 thru Aug. 16, during the Erie County Fair at the Heritage Barn to commemorate the 200th anniversary of the Connecticut Legislature setting aside the Firelands (in 1792), to compensate people that were burned out of their homes by the British during the Revolutionary War. Operation will be in the lower 50 kHz of the General phone subbands on 80m, 40m, 20m, 17m, 15m, 12m, and starting on the 10m Novice phone subbands (28.400) daily during the Fair. Radiograms for the Erie County area will be accepted via WB8LLY @ WB8JUI packet station. For certificate, send 9 x 12 SASE with two postage stamps affixed; QSL with contact number to ***Tim N8AHK, 1307 Fifth Street, Sandusky OH 44870-4201.***

AUG 14-16

SEATTLE, WA The Boeing Employee's ARC will operate a Special Event Station from the Museum of Flight, to commemorate the 50th Anniversary of the 1st Flight of B29. Frequencies: 28.400 MHz, 21.360 MHz and 14.280 MHz. Operating time will be 1700-2400 UTC. A QSL card with a black and white glossy photo of the B29 in flight will be sent to all who contact the Boeing ARC Special Event Station.

AUG 15-16

VANCOUVER,WA The Clark County ARC will operate Station W7AIA from the Evergreen Flying Field, just east of Vancouver WA, to help celebrate the 33rd annual Antique Aircraft Fly-in. Operation will be in the lower portions of the 40m, 20m and 15m bands (phone); they also expect some operation on the 75m phone band during the night. A very nice certificate will be available. Send your SASE (only) to ***CCARC, PO Box 1424, Vancouver WA 98668.***

AUG 22-23

LOS ANGELES, CA SE Station W1AW/6 will operate from the 1992 ARRL National Convention Aug. 22 and 23. Frequencies: General subband of 80m, 40m, 20m and 15m; Novice subband of 10m; and the VHF/UHF bands. For a certificate, send QSL and a 9 x 12 SASE to ***Hamcon, Attn: Dick Bruno N6ISY, PO Box 570756, Tarzana CA 91356.***

AUG 29

WRENTHAM, MA N1APE and N1IPR will operate from the Wrentham MA State School Cracker Barrel Fair and Hot Air Balloon Festival, Aug 29, 1400Z-2200Z. Frequencies: -7.243, 14.243, 21.343, 28.343. QSL and SASE for certificate to ***N1APE, 8 Abenaki Trail, Littleton MA 01460.***

AUG 29-30

WELLSBORO, PA The Tioga County ARC will operate Station WO3C from 1400Z Aug 29-1800Z Aug. 30, to celebrate the 99th anniversary of the Pennsylvania Park System. Operation will be in the lower portions of the General 80m, 40m, 20m, 10m. For QSL, send QSL and SASE to ***Darlene Rahn WO3C, Box 200 R.D. #6, Wellsboro PA 16901.***

SEP 4-5

BRADY, TX The Heart of Texas Ham Operators' Group (HOT HOG) of Brady, together with the 3M A.R.C. and the Brownwood ARC, both of Brownwood TX, will operate Station WD5H from the 19th Annual World championship Barbecue Goat Cookoff and 15th Annual Arts & Crafts Fair at Richards Park in Brady TX. This operation from the "geographic center of Texas" will take place primarily on SSB phone or about 28,325, 21,325, and 14,325 MHz, from 2000Z Sep. 4-2000Z Sep. 5. Rag chews are welcome. Some operators of this station may move off to other modes/frequencies at their discression. Ask if you are interested. For a certificate send your QSL and SASE to ***HOT DOG, c/o Larry W. Garens WD5H, 702 Bee St., Brady TX 76825-3014.*** RF

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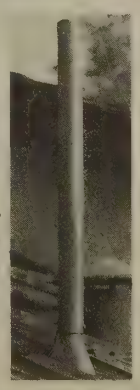

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CIRCLE 114 ON READER SERVICE CARD

what next?

by Carole Perry WB2MGP

Fun at the Youth Forum

This year's 1992 ARRL Hudson Division Convention was a smashing success. It was held Saturday, June 6th, at Fairleigh Dickinson University in Teaneck, New Jersey. There were many informative forums, including the ARRL Forum which featured such notable speakers as League President George Wilson III W4OYI and ARRL Executive Vice President Dave Sumner K1ZZ. But of course, the forum that is always nearest and dearest to my heart at any ham radio convention is the Youth Forum.

I've now tried to make it a policy that whenever I speak at any kind of ham radio gathering I would like to feature a youngster who is actively involved in the hobby. These Youth Forums that are starting to be featured across the country are simply terrific. If the word is properly gotten out ahead of time that hams should bring non-ham children with them to attend the forums, you can pack the room with young people who will listen to their peers describing the fun things they can do with amateur radio. This has proven to be a very successful recruiting technique.

Mark Hartmann N2MCV

I had the privilege of co-moderating the Youth Forum for the Hudson Division with young Mark Hartmann N2MCV. At age 16, Mark has the distinction of being the youngest assistant section manager for the ARRL in the country. He is in charge of youth programs for the North Jersey section. Rich Moseson NW2L, who is the North Jersey section manager of the ARRL, says, "Mark is the only teen-ager and one of only two people under 30 in a management position with the ARRL." Rich appointed Mark about seven months ago.

Mark first got interested in ham radio about a year and a half ago. He enjoyed scanning the police monitor and listening in on other bands. He soon decided it would be more fun to be able to transmit. Two local hams taught him the rudiments of ham radio and he was on his way. Mark's ham shack is in his family's garage. He keeps all his equipment in a home-made console. His only complaint is that it gets kind of cold out there in the winter because there's no heat in the garage.

In speaking with Mark, it is clear that he feels ham radio has helped him greatly in his school studies. He enjoys communicating with other people from his personal computer over the ham radio airwaves. Mark stays on the high bands—the UHF and VHF bands—that are for local communicating. He likes to speak with other hams in the Hudson region and tell them about what's going on in Sparta where he lives, and at school. Mark is in the process of trying to start a radio club at Sparta High School, where he is a sophomore. He wants to see more young people get licensed so that there can be more operators his own age to speak with on the air.

Mark did an excellent job addressing the group as my co-moderator. Many hams learned more about how to recruit, teach, and continue to encourage children into ham radio. The only problem that Mark and I had with this most enthusiastic audience was that we ran out of time much too quickly.

Dan Savio AA2GM

Dan Savio AA2GM was my featured speaker. Dan is 11 years old and lives in Ridgewood, New Jersey. He is in the 5th grade and holds an Extra class license. I had the pleasure of hearing Dan speak once before when he was one of the children I featured at the 1992 Dayton Hamvention Youth Forum. I was delighted when this very capable and articulate young man volunteered to speak again at the Hudson Division Convention.

Dan wowed the group assembled there as he told them that he first became interested in Morse code when he was only 4 years old. This precocious youngster has always been interested in electronics, especially in construction projects. It seems that his dad, who is a ham too, exposed Dan to computers and oscilloscopes at a real young age. Dan used to enjoy hanging around with his father and watching him at work with electronics equipment. Because Dan showed an interest in construction projects, he was kept busy by dad, who kept him supplied with plenty of them.

Today Dan enjoys working other stations by satellite and he loves digital communications like packet radio, AMTOR and RTTY. Dan shared with us that he's working on his DXCC in CW. Here indeed is a young man we can only hope will be representative of the future of amateur radio. This terrific young ham will always be welcome to share his experiences at any forum I speak at.

I encourage those of you who are interested in recruiting youngsters into ham radio to consider the following opportunities. The number-one best place to set up a station is at a school so that many children will get exposure to the fun of live contacts. Convince your club to run a "Youth Night" once a month. Advertise in your local newspaper or at your nearest McDonald's or Burger King. Be prepared to greet the children with speakers and activities that they will enjoy. Send enthusiastic speakers from your club into local Scout meetings and Sunday school groups. Consider an exhibit at a local library or at the mall.

There are many bright and talented youngsters out there who would be an asset to amateur radio if they only knew of its existence. If you've been involved with a successful recruiting program, please write to me so that we can share our best ideas with each other. RF

Photo A. Dan Savio AA2GM speaks at the Youth Forum at the Hudson Division Convention.

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CIRCLE 152 ON READER SERVICE CARD

PC Artwork Made Easy

Lift layouts from the page with transparent contact paper.

by Ed Eggert W3HIK

A commercial product exists to lift PC artwork from magazine articles. The material was somewhat expensive for my 14-year-old son, Chris, a prolific builder, who hit upon an inexpensive alternative.

Essentially, all you need is some clear contact-type paper from your local discount or office supply store, or any pressure-sensitive transparent plastic.

Make a Xerox® copy of the magazine pattern you wish to produce. The reason for this will be clear as you read on. Now carefully peel off the contact paper backing and apply the plastic to your Xerox copy of the artwork, forcing out all the air bubbles with a blunt instrument. The next step is to soak it in a dish of warm soapy water for about 20 minutes. After soaking, rub the Xerox paper with your finger until it is completely dissolved. At this point you will have the plastic with an image lifted off the artwork.

Now prepare your circuit board by washing it with scouring powder to remove contaminants, and allow to dry overnight. The board, as prepared now, is ready for sensitizing in a safelight area. We use a yellow bug light in a dark room for this operation. Since most magazine articles show positive artwork, we use a positive photoresist and carefully spray it on the copper side. This is then allowed to air-dry overnight in a dark room.

Now place your contact paper mask over the copper side of the board and use your exposure frame (we use two pieces of plate glass held together with clothespins). This should be done under safelight conditions only.

Exposure can be done with sunlight, photoflood lamp, or even a fluorescent lamp. About four minutes in sunlight works for us; you may have to experiment at this point.

After exposure, remove the mask and place the circuit board in a developer solution per the instructions on the solution bottle and slowly agitate. When all of the resist is gone, wash the board in fresh water to stop the resist action. Now clean the board with an SOS pad and soapy water.

Use the previously-made mask as a drill guide when drilling out your board.

As you can see, this is a very inexpensive way to reproduce professional circuit boards. The contact paper also can be used to make decals for panels or meter scales, even in color. Naturally, the edges should be sealed with a little clear urethane to keep them from lifting. RF

Reprinted from the June 1980 issue of 73 Magazine for Radio Amateurs.

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Radio Fun flea market

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 30,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar, and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The *Radio Fun Flea Market* costs you peanuts (almost)—comes to 10 cents a word for individual (noncommercial) ads, and 70 cents a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad. This is a monthly magazine, not a daily newspaper, so figure a couple of months before the action starts; then be prepared. If you get too many calls, you priced it too low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right, and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using.

Send your ads and payment to *Radio Fun Flea Market*, Sue Colbert, 70 Route 202 N, Peterborough NH 03458, and *get set for the phone calls.*

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WANTED: The address for a business that does Ham plaques + related engraving. KD4BAW, 1023 E. Dolly Ann Dr., Covington VA 24426-3002. RF806

WANTED: IC-735 Antenna tuner, 6 Meter SSB 12 Volt. WB4CZE Gary Thuener, 8 Avenida Carita, FT Myers Beach FL 33931. RF807

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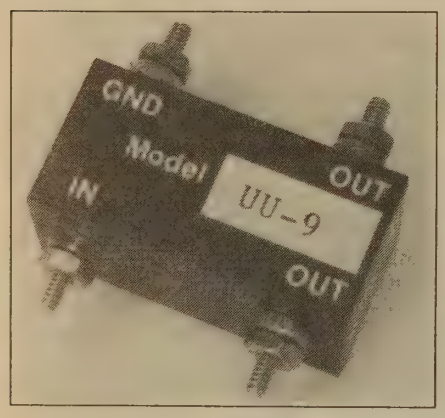

PALOMAR ENGINEERS

Palomar Engineers has announced a new addition to their balun transformer line, the UU series Ununs (*un*balanced-to-*un*balanced transformers). The Ununs match 50-ohm coax to unbalanced loads such as Beverage antennas, folded verticals, etc. The UU series baluns are available to match loads of 75, 100, 150, 200, 250, 300, 375, 600 or 800 ohms at power levels to 350 watts PEP in the frequency range 1.8-30 MHz.

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HART PUBLISHING

John Hart NØOCF, owner of Hart Publishing, has announced the publication of the fourth edition of the *Amateur Radio Mail Order Catalog and Resource Directory*. This July 1992 edition has 220 pages and more than 1,200 entries of mail-order products and services for hams. The catalog is categorized and alphabetized into easy-to-find headings from "Antennas" to "Weather Instruments." Listings include the name, address, phone and fax number of the vendor, plus a description of products or services. Also included are new, non-radio-related listings, such as environmental organization BBS's. The catalog also has the complete *Ham-Soft Shareware Catalog* included. The *Resource Directory* part contains a "Directory of 100+ Free Catalogs," a "Directory of Catalogs for a Fee," a "Directory of Radio Clubs," and much more.

To maintain accurate listings, the catalog is updated and published twice a year. A two-issue subscription is $20 ppd. in the U.S., $25 ppd. foreign; the single issue price is $12. Contact *John Hart NØOCF, Hart Publishing, 767 South Xenon Court, Suite 117, Lakewood CO 80228; (303) 987-9442.* Or circle Reader Service No. 201.

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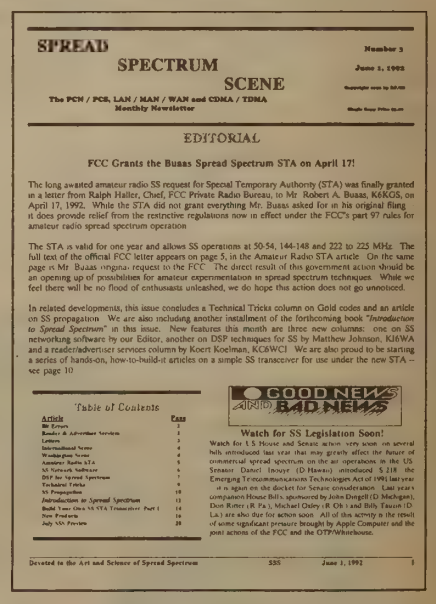
The RTTY Datacard is printed on 8-1/2" x 11" color stock and thickly laminated to stand up under long and heavy use. One side of the card lists and explains the various RTTY emission modes and the Yarbrough system. The other side contains the Matrix Tuning Table, which lists baud rate and the various RTTY transmission methods falling under narrow, medium and wide shifts for that tuning rate and also summarizes the tuning method.

The RTTY DataCard is priced at $6 plus 50 cents S&H ($1 foreign). Visa and MasterCard are welcome. Contact *Tiare Publications, P.O. Box 493, Lake Geneva WI 53147; (414) 248-4845.* Or circle Reader Service No. 204.

SPREAD SPECTRUM SCENE

The *Spread Spectrum Scene* newsletter is published for the interchange of the latest news and information about the growth, regulation and opportunities in the evolving technology of spread spectrum. Covering PCN, PCS, LAN, MAN, WAN, CDMA and TDMA technologies, the newsletter is intended for the working professional as well as the experimenter, student and amateur radio operator. Monthly features include: International and Washington reports; a spread spectrum networking software column; a DSP column; a Technical Tricks column on hands-on spread spectrum techniques; antenna and propagation articles; serialization of a new book on spread spectrum and reader contributions on subjects relating to spread spectrum.



SPREAD SPECTRUM SCENE

The PCN / PCS, LAN / MAN / WAN and CDMA / TDMA Monthly Newsletter

Number 3

June 1, 1992

EDITORIAL

FCC Grants the Buaas Spread Spectrum STA on April 17!

The long awaited amateur radio SS request for Special Temporary Authority (STA) was finally granted in a letter from Ralph Halter, Chief, FCC Private Radio Bureau, to Mr. Robert A. Buaas, K6KGS, on April 17, 1992. While the STA did not grant everything Mr. Buaas asked for in his original filing it does provide relief from the restrictive regulations now in effect under the FCC's part 97 rules for amateur radio spread spectrum operation

The STA is valid for one year and allows SS operations at 50-54, 144-148 and 222 to 225 MHz. The full text of the official FCC letter appears on page 5, in the Amateur Radio STA article. On the same page is Mr. Buaas original request to the FCC. The direct result of this government action should be an opening up of possibilities for amateur experimentation in spread spectrum techniques. While we feel there will be no flood of enthusiasts unleashed, we do hope this action does not go unnoticed.

In related developments, this issue concludes a Technical Tricks column on Gold codes and an article on SS propagation. We are also including another installment of the forthcoming book *"Introduction to Spread Spectrum"* in this issue. New features this month are three new columns: one on SS networking software by our Editor, another on DSP techniques for SS by Matthew Johnson, KI6WA and a reader/advertiser services column by Koert Koelman, KC8WCI. We are also proud to be starting a series of hands-on, how-to-build-it articles on a simple SS transceiver for use under the new STA – see page 10

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GOOD NEWS AND BAD NEWS

Watch for SS Legislation Soon!

Watch for U.S House and Senate action very soon on several bills introduced last year that may greatly effect the future of commercial spread spectrum on the air operations in the US. Senator Daniel Inouye (D Hawaii) introduced S 218 the Emerging Telecommunications Technologies Act of 1991 last year. It is again on the docket for Senate consideration. Last year's companion House Bill is sponsored by John Dingell (D Michigan), Don Ritter (R Pa.), Michael Oxley (R Oh.) and Billy Tauzin (D La.) are also due for action soon. All of this activity is the result of some significant pressure brought by Apple Computer and the joint actions of the FCC and the OTP/Whitehouse.

Devoted to the Art and Science of Spread Spectrum — SSS — June 1, 1992 — 1

The subscription price and more information, contact *Randy Roberts KC6YJY, RF/SS—Spread Spectrum Scene, P.O. Box 2199, El Granada CA 94018-2199; (415) 726-6235, subscriptions only: (800) 524-9285, Fax: (415) 726-0118.* Or circle Reader Service No. 202.

Uncle Wayne's Bookshelf

BOOKS FOR BEGINNERS

20N018 **Technician Class License Manual: New No-Code** ***by Gordon West*** This book will cover everything you need to become a Technician Class Ham. Every exact question and answer on the examinations is found in this one book covering element 2 and element 3A question pools. Gordon West tells you the right answer and then explains in detail why the answer is correct. Fully illustrated text, frequency chart showing privileges, list of examiners and an FCC Form 610 application. **$9.95**

20N092 **The Wonderful World of Ham Radio** ***by Richard Skolnik, KB4LCS*** This book addresses the plea that something simple, clear, and fun be written to introduce young people to amateur radio. Pick up one for the new ham in your life. **$7.95**

20N099 **Digital Electronics Projects for Beginners** ***by Owen Bishop*** contains 12 digital electronics projects suitable for the beginner to build with the minimum of equipment. 128 pp., 56 line drawings **$12.50**

20N100 **Electronics Build and Learn (2nd edition)** ***by RA Penfold*** combines theory and practice so that you can 'learn by doing.' Full construction details of a circuit demonstrator unit that is used in subsequent chapters to introduce common electronic components. Describes how these components are built up into useful circuits, oscillators, multivibrators, bistables, and logic circuits. 128 pp., 18 photos, 72 line drawings. **$12.50**

AR2073 **Novice Antenna Notebook** A beginner's guide to easy and effective antennas and tuners you can build. **$8.00** An ARRL Publication.

AR2871 **W1FB's Help for New Hams** ***by Doug DeMaw W1FB*** Complete for the newcomer. Put together a station and get on the air. **$10.00** An ARRL Publication.

AR2286 **First Steps in Radio** ***by Doug DeMaw W1FB*** Series of *QST* articles. See components assembled into practical circuits and how the circuits make up your radio gear. **$5.00** An ARRL Publication.

AR3291 **Now You're Talking!: Discover the World of Ham Radio** Successor to the immensely popular *Tune in the World with Ham Radio*. Covers everything you need to know to earn your first Amateur Radio license. More than a study guide, this book will help you select equipment for your ham radio station and explain how to set it up—everything you'll need to know to get on the air! An ARRL Publication. **$19.00**

AR3292 **Your Introduction to Morse Code: Practice Cassettes** companion code course to *Now You're Talking!*, this kit includes two 90 minute cassette tapes. Prepares you for the 5 WPM Morse code exam to earn your Novice license or add high-frequency worldwide communications privileges to your code-free Technician license. **$10.00**

SHORTWAVE

06S57 **1992 Passport to World Band Radio** ***by International Broadcasting Services, Ltd.*** You can have the world at your fingertips. You'll get the latest station and time grids, the 1992 Buyer's Guide and more. 384 pages. **$16.50**

07R25 **The RTTY Listener** ***by Fred Osterman*** New and expanded version. This specialized book compiles issues 1 through 25 of the *RTTY Listener Newsletter*. It contains up-to-date, hard-to-find information on advanced RTTY and FAX monitoring techniques and frequencies. 224 pages. **$19.95**

09S42 **The Scanner Listener's Handbook** ***by Edward Soomre N2BFF*** Get the most out of your scanner radio. Covers getting started, scanners and receivers, antennas, coaxial cable, accessories, computer controlled monitoring, more. **$14.95**

03S208 **Radioteletype Press Broadcasts** ***by Michael Schaay*** Covers schedules of Press Services by time, frequency, and country broadcasting in English, French, German, Spanish, and Portuguese. Detailed Press Agency Portraits. 120pp. **$12.95**

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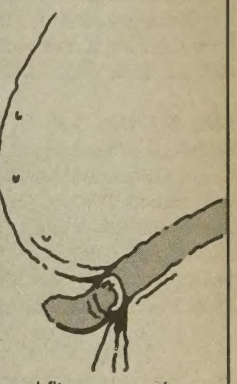

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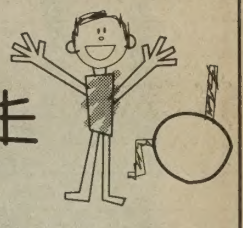

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letters Continued from page 5

James S. Kaplan KG7FU, Bellingham WA I'm not sure exactly when the radio bug bit me, but it must have been early. When I was about 11, my uncle would give me motors and gearboxes to take apart for fun. One day he gave me a truckload of Army surplus electronics parts. Among the dysfunctional boxes was a shortwave receiver and a BC-458 aircraft transmitter.

I had to beg my mother not to throw out all that neat stuff, but all I could save was the receiver and the BC-458. After a little fiddling and some help from my father, I had the receiver working. I put up a 50- or 60-foot piece of bell wire and "tuned in the world." My whole family was disgusted with the mess I had made getting this antique piece of junk to work. Despite their misgivings, I was awarded a Radio Shack shortwave kit the following year as a birthday present (presumably to get rid of the old and dangerous stuff). That was in 1976, and I think Radio Shack has discontinued such fun kits. How many 12-year-olds do you know who could put together such a complicated kit now?

My love affair with radio waned for a few years and the shortwave receiver ended up in a closet (only to be sold years later at a ham flea market). Entering high school, I discovered CB radio.

CB quickly replaced SWLing and for a few years it had my complete attention. I met a lot of interesting folks through CB radio. Some are still good friends. Matter of fact, one of them was a fellow named Adam who claimed to be a ham by the call WA6LMO (I would later find out he was a bootlegger!) whose operating habits had a profound impact on mine. Partly through his influence and that of Joe DeAngelo KA6IWF (now KM6MK) I would later become a ham. (Adam "WA6LMO" wasn't your average bootlegger. He was a good operator and could copy CW in excess of 40 wpm in his head! He even helped several hams learn high speed code, including WE8K. Why he never got a "real" license is a mystery to all who knew him.)

I spent most of my high school days and a year or two after getting in a lot of trouble. I was having too much fun with girls and motorcycles and such to even stay in school. I ended up dropping out of school and working a myriad of strange jobs to support myself. I'm quite lucky my rebellious youth didn't land me a spot in jail or worse. I never did graduate from high school, but I later went back and took and passed the equivalency tests. I even went to the local community college and took some classes to better myself. Some of those classes were in basic electronics.

One day I was shopping for oddball electronic parts. The local electronic supply house didn't have what I wanted and I asked the salesman where to go. He told me of an electronic surplus outfit on the edge of town, so I searched it out. I found the place and was shocked to see what was inside. Advanced Component Electronics in Santa Clara, California, was just a warehouse of electronic surplus. I had never seen anything like it: palettes, racks and shelves bulging with resistors, ICs, capacitors and all sorts of finished goods rejected by manufacturers. I got what I came for and came back many times to fill my shelves with parts.

I came into the store one day with another purpose. I had clipped an ad for a sales position in the local newspaper. After a quick interview with the manager I was hired. This is where I met many local hams and KM6MK. Joe and I quickly became friends. He would always heckle me about being a CBer and bug me to get my amateur license. After awhile I succumbed and he started teaching me CW. After two tries I passed the 5 wpm code test and the written one for my Technician license. That was in April 1988. I was awarded the call N6SJE. Later that fall I married and moved to Tacoma, Washington, and traded N6SJE for N7LXQ.

I spent a good deal of time working odd jobs in the Tacoma area, as the electronics industry there was immature compared to the San Francisco Bay Area, and jobs were few. I once again answered an ad in a newspaper. This one was different. This ad asked that the applicant be knowledgeable in electronics, sales and optionally be a ham radio operator! I interviewed with another ham, John Schnieder KB7AK, in Seattle. Again, after a brief interview, I was hired.

John's company is RF Specialties of Washington. I was schooled in the fine art of selling radio broadcast equipment. I spent the next two years having the time of my life. I learned nearly all there is to know about the radio broadcast business from some of the best engineers (and hams) in the industry. I traveled the country to attend trade shows and visit radio and TV stations.

Unfortunately, this dream would soon turn into a nightmare. My wife decided to divorce me and move with our son back to California. I decided to stick it out on my own in Seattle for a while, but soon decided to go back to California to be near my family. I did, but not before upgrading to KG7FU.

I spent a little while with one of the companies I formerly sold equipment for in Santa Clara, California. I again started to travel the country and even represented them at a broadcasters' trade show in Brighton, England. After that I joined another former salesman in a venture to sell equipment outside of the "old boy" network in California.

A few months back, I got a call from John Price N7MWV, asking me if I'd like a part-time job wiring a few studios at KEZX in Seattle, John told me about a radio station in Bellingham that was looking for an engineer. I made the call and met with the general manager on a Saturday afternoon (I even called back to California to have a copy of my resume faxed). I had a nice interview, and toured the beautiful city of Bellingham before returning to Seattle to finish the job.

I went home to California and a few weeks later the station manager called me and we worked out a deal. I am now the chief engineer at KPUG AM and KAFE FM.

I can't stress enough how amateur radio has affected my life. I have always had positive experiences on the air and with every eyeball QSO. It has given my otherwise topsy-turvy life a positive direction. I have made countless friends through it, and without it I doubt I'd be where I am today. RF

YAESU

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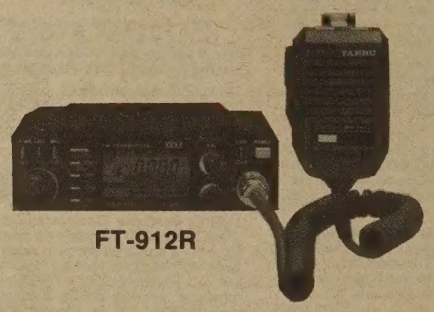
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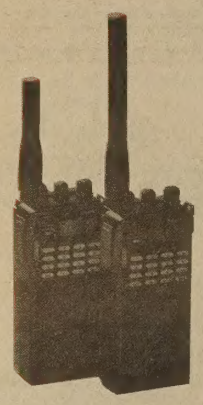
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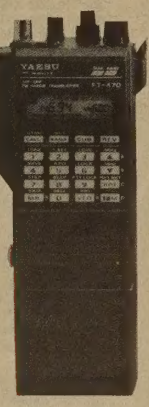
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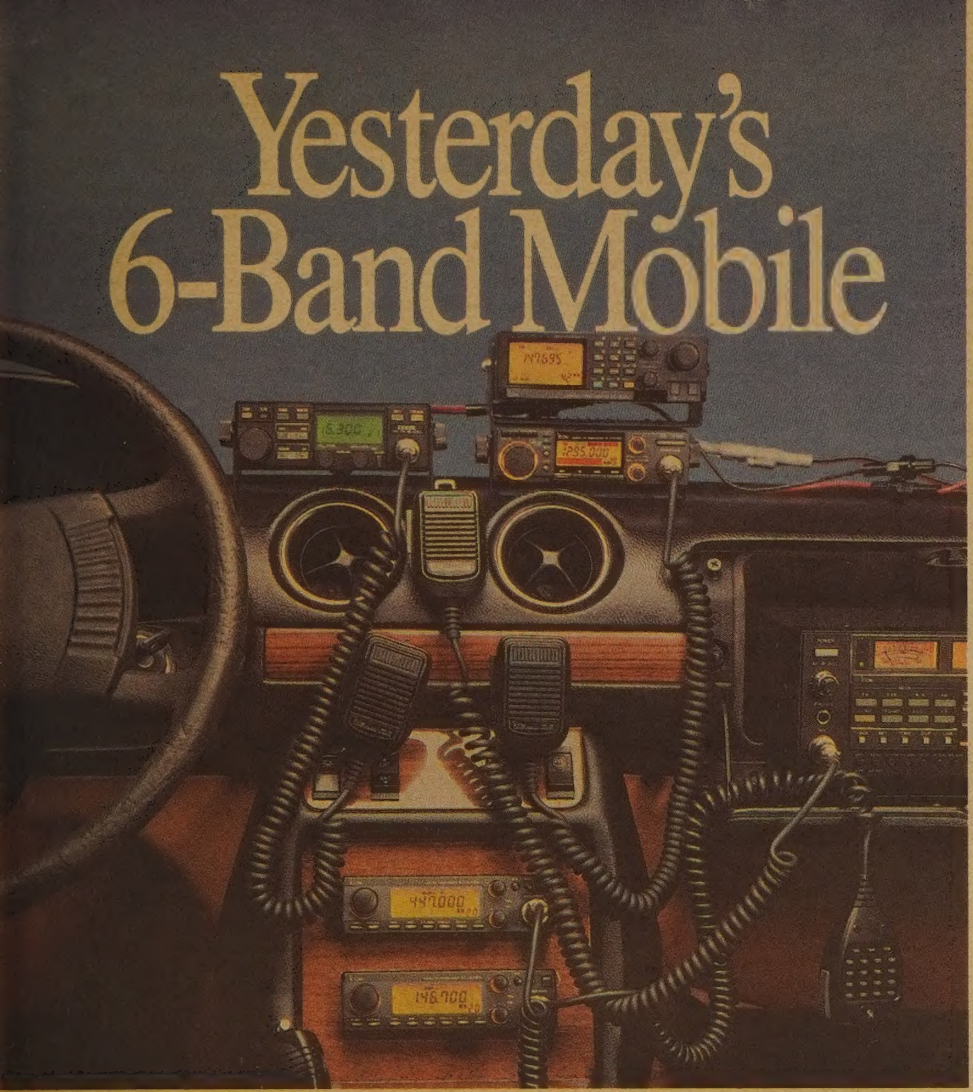

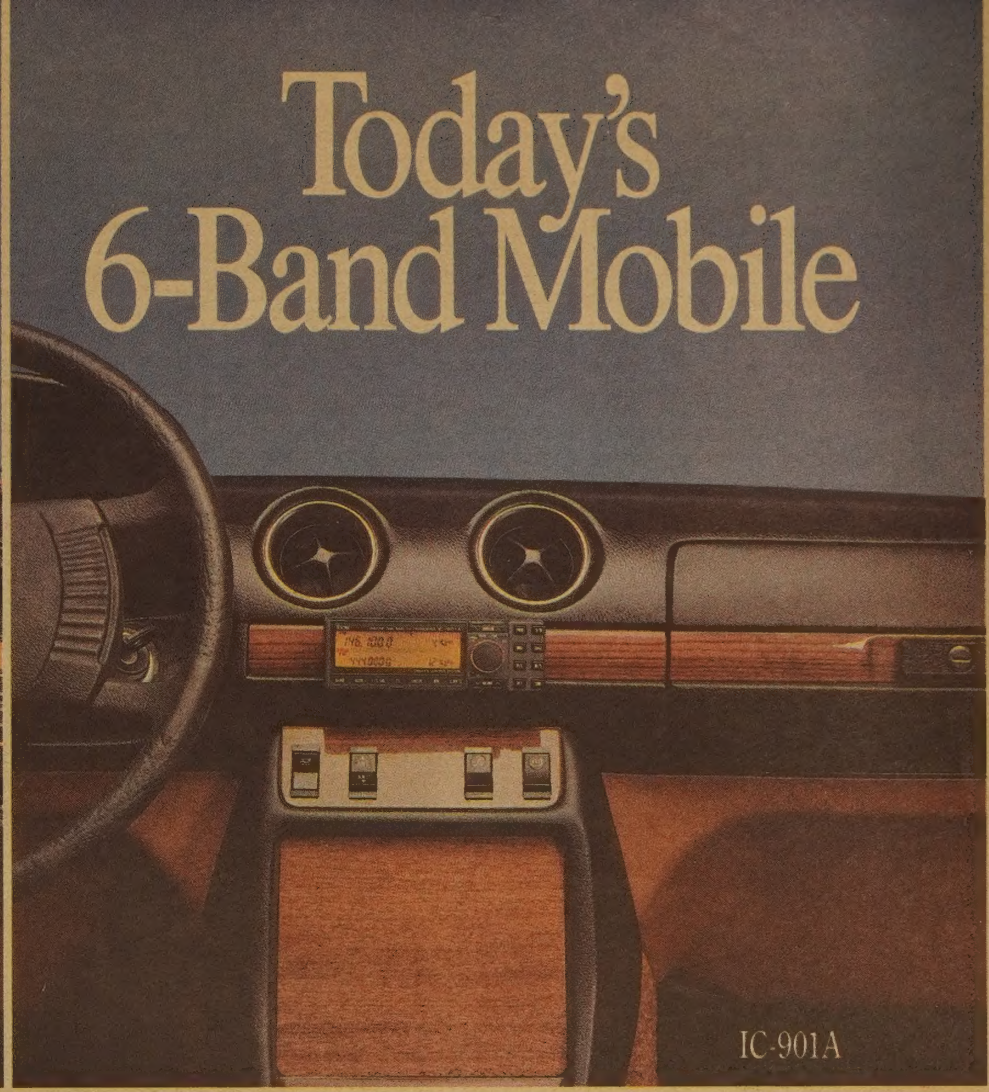

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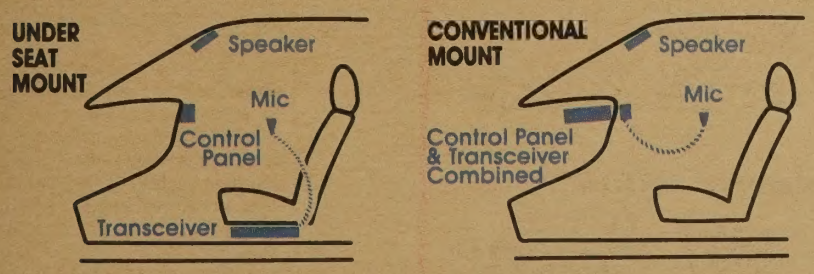

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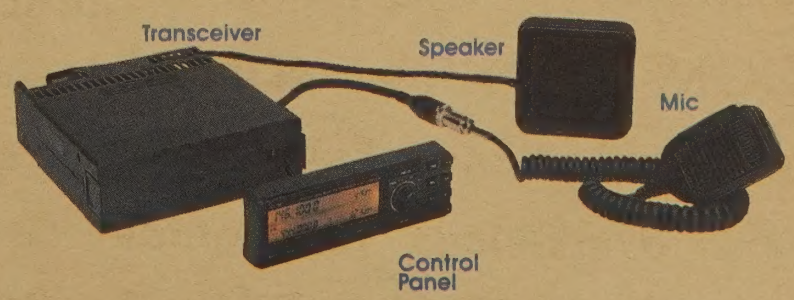

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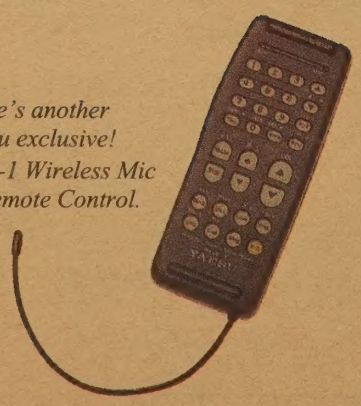

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